bushfire CRC

AUSTRALIA – UNITED STATES JOINT RESEARCH SYMPOSIUM FIRE IN THE INTERFACE JUNE 2010

Group at Parliament house

Contents

Communiqué

A suite of potential bushfire/wildfire research projects has been identified by Australian, New Zealand and United States researchers and fire managers.

The joint project proposals focus on the areas of community safety and situational awareness, building planning and fire behaviour, as they relate to fire management before, during and after a bushfire or wildfire.

These proposals are an outcome of the United States-Australasian fire research symposium ***Fire in the Interface***. Participants with specific expert knowledge were invited to the symposium to discuss the current state of knowledge, issues confronting communities and fire fighters, and the gaps in knowledge for addressing fire within the area that has the greatest threat to life and property – the heavily vegetated residential communities, also known and the rural-urban or wildland-urban interface.

More than 40 invited Australian, New Zealand and United States researchers, practitioners and policy-makers gathered in Melbourne and Canberra from 14-18 June 2010 for the research symposium.

The meeting was organised by the Bushfire Cooperative Research Centre in conjunction with the departments of Prime Minister and Cabinet, and Attorney General in Australia, and the Department of Homeland Security in the United States

The aim of the symposium was to share knowledge on fire risk on the rural-urban interface and to explore areas for collaborative research projects in fire behaviour, rural-urban interface planning and community safety. The meeting acknowledged the many research projects currently addressing various parts of this issue and there was substantial agreement in the value of linking the work of researchers internationally.

Significant outcomes of the symposium included:

- The identification of areas of common interest that require new knowledge through research.
- The exposure of leading researchers and fire managers to a broader understanding of managing fire on the rural-urban interface.
- The development of ongoing cooperative links across rural and urban fire managers from all participating countries, and between researchers from a wide range of academic disciplines.
- The involvement and ongoing commitment to a high level of interest from key national and state government departments, in Australia, New Zealand and the United States.

The next step will be to more fully develop the research proposals and seek appropriate funding mechanisms to support the international collaboration.

The symposium met in Melbourne on Monday 14 June and spent the last part of the week in Canberra, including meeting in Parliament House. The group visited the areas devastated in the 2009 February Black Saturday fires in Victoria and the suburbs of Canberra burnt in 2003.

Supporters

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US Department of Homeland Security
US Department of Agriculture Forest Service
US Fire Authority
National Fire Protection Association
CALFIRE
California EMA
Ventura County Fire Department
University of California, Berkeley
California Polytechnic
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Australian Government
Australian Department of Prime Minister and Cabinet
Australian Attorney General's Department
Australian Department of Industry, Innovation, Science and Research
Victoria Government
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Metropolitan Fire Brigade
Department of Sustainability and Environment
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CSIRO Sustainable Ecosystems

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Background

Following approached by The Australian Department of Prime Minister and Cabinet and the USA Department of Homeland Security the bushfire Co-operative Research Centre agreed to host a joint Australasian-US Joint symposium on research for fire in the Rural (wildland) urban interface. This Symposium was organized under the existing treaty for National Security Science and Technology exchange and collaboration between the US and Australia.

Both countries are encountering an increasing level of risk and loss associated with bush (wild) fire impact, particularly in areas at the interface between the rural (wildland) and the urban areas. Both countries have substantial research efforts addressing various parts of this issue and there is substantial agreement in the value of linking the work of researchers.

Symposium Aim: Sharing of knowledge regarding the management of fire risk for people, assets and environment at the interface.

- To develop lasting networks within research communities to facilitate the above aim
- To identify collaborative research areas
- To develop proposed joint project areas for possible future bilateral investment.

The symposium considered three major theme areas as outlined below. It considered the alternatives before, during and after an event. The symposium:

1. considered the existing knowledge
2. identified gaps and opportunities
3. developed plans and priorities for further investigation

Fire Behaviour

- An understanding of the propagation of fire in interface areas
- A review of fire danger ratings
- Interactions of terrain, fuels, weather and fire
- The options for fuels management in and around the interface

Interface planning, risk management/building construction

- Urban planning in a fire prone environment
- Legalisation and policy alternatives
- Post fire analysis techniques
- Building codes/standards: construction materials and techniques for active and passive protection
- Provision of water for suppression
- The different types of interface communities

Community safety

- Role of the community in protection (Prepare, Leave Early or Stay and Defend. Ready, Set, Go, or Shelter in Place, forced evacuation, other alternatives)
- Community safe areas (bunkers, refuges, safe areas, evacuation centres)
- Management of competing values (life and property, environment, water, etc)

Reflections

USA Department of Homeland Security

To be added by DHS

Australia Department of Prime Minister and Cabinet

To be added PM&C

Bushfire CRC

The Symposium has help to establish and strengthen linkages between the US and Australian researchers. Along the way a number of good friendships have been developed. Through the mix of working session and networking events it has been possible to reach a robust set of proposal for joint research. This symposium was initially built on the memorandum of understanding initially developed between the Bushfire CRC and the USDA Forest Service. The ongoing challenge will be to continue the work on developing the research proposals and seeking sufficient funding to ensure they progress. The networks developed will last beyond the research projects.

This symposium was a worthwhile investment of funds by the Australian partners of the Bushfire CRC, and we look forward to the continuance of the relationships.

Attendance

The attendance was matched with approximately equal numbers of researchers, policy makers and practitioners from the US and Australasia. In order to ensure close networks were formed and meaningful discussion took place the attendees were carefully chosen and limited t approximately 20 people from each country. Each country managed their own invite list.

Attendance list

Ross Bradstock University of Wollongong

Professor Ross Bradstock is Director of the Centre for Environmental Risk Management of Bushfires, University of Wollongong. His research interests include: fire ecology, fire risk analysis and modelling, conservation biology, landscape ecology and climate change. He is currently engaged in collaborative projects with the CSIRO Climate Adaptation Flagship, Commonwealth Department of Climate Change, NSW Rural Fire Service, NSW Department of Environment, Climate Change and Water, NSW Department of Infrastructure and Investment, Bushfire CRC, United States Geological Survey, Australia New Zealand Network for Vegetation Function.

Naomi Brown Australasian Fire and Emergency Service Authorities Council

Naomi Brown has been the Chief Executive Officer of the Australasian Fire and Emergency Service Authorities Council (AFAC) since December 2006. Naomi is also a Board member of the Bushfire CRC and the National Aerial Firefighting Centre. Naomi took up the role of Director Community Safety at the Country Fire Authority (CFA) of Victoria in 2003. She had previously worked with the WA Fire and Emergency Services (FESA) for five years. She spent time there as Executive Director Community Safety and also Executive Director State Emergency Service and Volunteer Marine Rescue.

David Bruce Bushfire CRC, Communications Manager

David has been responsible for media relations and all communications for the Bushfire CRC since 2006. Prior to that he has been a journalist with Melbourne's daily broadsheet The Age and News Limited's community newspapers, and a Communications and Media Manager at Monash and Deakin universities.

Mark Chladil Tasmania Fire Service

Mark Chladil has been the Fire Management Planning Officer for the Tasmania Fire Service since 1994. His role is to provide policy and technical support for bushfire related issues. During fire events he also provides incident management support in the areas of fire behaviour and planning. Mark represents the Australasian Fire and Emergency Services Authorities Council (AFAC) on Australian Standards Committee FP – 020 which is responsible for the Australian Standard AS359-2009 Construction of Buildings in Bushfire Prone Areas. In recent times Mark was a member of the fire research team investigating house fire losses in the Victorian bushfires. Mark gave evidence on behalf of the AFAC to the Victorian Bushfire Royal Commission on issues about the Australian Standard and then made a second appearance at the request of the Royal Commission as a member of the experts forum on planning related issues.

Jack Cohen USFS-WUI Structural ignition research

Tom Cova Univ of Utah-Evacuation Studies

Tom Cova is an associate professor of Geography at the University of Utah where he serves as Director of the Center for Natural and Technological Hazards and the GIScience Certificate Program. He received a BS in Computer Science from the University of Oregon and an MA and PhD in Geography from the University of California Santa Barbara where he was an Eisenhower Fellow. His research and teaching interests are hazards, transportation, and geographic information systems with a particular focus on protective actions in wildfires.

Mike Dayton CAL EMA

Mike Dayton has worked at the California Governor's Office of Homeland Security since its inception in March of 2003. Since the merger of the Governor's Offices of Homeland Security and Emergency Services, which resulted in the establishment of the California Emergency Management Agency (Cal EMA), Mike has served as the Chief of Staff and Deputy Secretary.

As the Chief of Staff and the Deputy Secretary of Cal EMA, Mike helps develop the overall strategic priorities and assists in the day-to-day management and operations of the agency. He provides guidance on the development of defensible strategies to wisely invest over $400 million in federal and state funds to enhance homeland security on annual basis. He serves as the primary representative to the California Legislature and Congressional delegation and manages the communications, audits, civil rights, legal, legislative affairs and policy divisions at Cal EMA. Prior to joining the office of Homeland Security and Cal EMA, Mike was a Congressional staffer for 13 years.

Chris Dicus Cal Poly-Forest fire fuels

Dr Chris Dicus is a Professor of Fire and Fuels Management at California Polytechnic State University in San Luis Obispo. His research focuses on how fuel treatments in the wildland-urban interface impact both fire behavior and ecosystem services such as carbon sequestration and vegetative air pollution removal. He has participated in many post-fire assessments, including the 2007 Southern California Fire Siege and the 2009 Black Saturday Fires in Victoria. He serves on the Board of Directors of the Association for Fire Ecology.

Steve Dovers Australian National University

Professor Steve Dovers is Director of the Fenner School of Environment and Society, Australian National University. His research and teaching interests cover the policy and institutional dimensions of resource management, disasters, and climate adaptation. Among his recent works are the co-authored books "Institutional change for sustainable development" (Elgar 2004) and "The Handbook of disaster and emergency policies and institutions" (Earthscan 2007).

Christopher Doyle Director, S&T IGD

Christopher Doyle currently leads the US Department of Homeland Security, Science and Technology Infrastructure and Geophysical Division (DHS S&T IGD). As Division Director, he is responsible for DHS' research and development (R&D) initiatives in the areas of emergency response and critical infrastructure protection.

In his 17 years of public and private sector service, Mr Doyle has developed a proven track record for identifying and anticipating trends in critical infrastructure protection and emergency management. He has successfully managed recovery efforts in several disasters, including the 1994

Northridge Earthquake, where he was responsible for the administration of over $6 billion in recovery grant funds. He was also responsible for the development of several policies related to disaster recovery to facilitate the streamlined award of grant funding to local and State governments.

From 2001 until 2003, Mr Doyle managed the day-to-day operations of both the National Earthquake Hazards Reduction Program and the National Dam Safety Program, facilitating transition of both programs into the post 9-11 environment.

Liam Fogarty Dept of Sustainability and Environment, Victoria

Liam is the Assistant Chief Officer - Planning and Knowledge for the Department of Sustainability and Environment, Victoria. Liam has worked in land, fire and emergency management in several states of Australia, New Zealand as well as Indonesia. His experiences and interests include fire fighting, forest and fire management planning and research, emergency response coordination, as well as state and national policy development.

Tom Foley CAL FIRE

Chief Foley has over 20 years of progressive experience in the fire service. He has experience in both wildland and municipal fire operations. As a CAL FIRE Chief Officer Chief Foley has command and control experience in both field and regional oversight applications. Chief Foley also has technical experience working on National and State Committees such as; Fire Equipment Working Team (National Wildfire Coordination Group), Fire Shelter Task Group (National Wildfire Coordination Group), First Responder Working Group (US Department of Homeland Security) and Chairperson of the State-wide Personal Protective Equipment Working Group (CAL FIRE).

Ethan Foote Fire Prevention Officer - WUI Building Codes

Ethan Foote is co-chair of the California Fire Chiefs Association Wildland-Urban Interface Committee and is an Assistant Fire Chief with the (CALFIRE) Office the State Fire Marshal where he leads development of California State building construction regulations to protect homes from wildfire. Chief Foote started his fire service career with CALFIRE in 1976 with eight seasons of wildland fire control experience followed by 10 years in engine and aerial truck company officer assignments throughout California. As a Battalion Chief in 1994 with the Napa County Fire Department (CALFIRE), he worked in fire prevention for five years as the county's first Fire Marshal. He held regional CALFIRE management positions in fire planning, national Fire Plan grant management, and fire prevention prior to his current assignment at the Office the State Fire Marshal.

After studying forest fire science and earning a Bachelors of Science degree from the University of Washington (Seattle) in 1984, Chief Foote completed a Master's of Science program in 1994 at the University of California at Berkeley. While at Berkeley he conducted the first statistical retrospective study of building survival in California wildfires based on similar studies in Australia on the "Ash Wednesday" fires. Following his investigation of building ignition mechanisms and hazard mitigation measure effectiveness on the 1990 Santa Barbara "Paint" fire, Chief Foote has managed or participated in almost two dozen post-fire building damage surveys.

Jim Gould CSIRO

Jim Gould is Principal Research Scientist for CSIRO Sustainable Ecosystems Bushfire Dynamics and Application Group and the initial Program Leader with the Bushfire CRC. Jim has been working with CSIRO for over 28 years with his first project in evaluation of air tankers and a cost-benefit study of aerial suppression of bushfires. On completion of this study, Jim concentrated his research into fire behaviour and fuel management of various vegetation types throughout Australia. The results of this research has been a revision of grassland fire behaviour models, prescribed burning guidelines in young eucalypt forest in south eastern Australia. Jim is working with other bushfire scientists from CSIRO and Western Australia investigating the behaviour and spread of high-intensity bushfires in dry eucalypt forests with different fuel ages and understorey vegetation structures. Jim research role in coordinating research project for both CSRIO and the Bushfire CRC in the area of fire behaviour, fire weather, and suppression technology, bushfire risk management and climate adaption related to fire management. In 2008/09 he was on an interchange program in Canada has a Senior Forest Fire Science Advisor for the Canadian Forest Service.

Randy Griffin Program Specialist, S&T IGD

Captain Randy Griffin has been an active member of the fire service and public safety community for over twenty years. His experience includes that in public safety, fire protection, weapons of mass destruction, emergency preparedness, planning and response. Mr. Griffin has been detailed to the US Department of Homeland Security, Science and Technology Directorate since 2005; where he serves as the senior liaison for state and local interaction and as the principal division point of contact to FEMA.

Mr Griffin currently serves as an adjunct instructor within the Public Administration Department at Syracuse University's Maxwell School of Citizenship and Public Affairs. Mr. Griffin's graduate level course builds a framework for state and local administrators to manage emergency preparedness and response programs.

His emergency management experience includes work in emergency operation centers for the Northern New York Ice Storm and the Onondaga County Labor Day Storm. While on detail to the Department of Homeland Security, he was deployed as a member of Arizona Task Force-1, one of the Federal Emergency Management Agency's Urban Search and Rescue Teams to Hurricane Rita. Capt. Griffin spent a week on the ground conducting search and rescue missions for survivors of the storm. He also spent a week in California, during the 2007 wildfire siege, working with federal officials at the Joint Field Office, State officials at the State Operations Center and local officials in Orange County.

Gary Jensen Director, Asia-Pacific Liaison, DHS S&T, Program Analyst, Asia-Pacific Portfolio, DHS

Captain Gary Jensen USN (ret) attended the US Naval Academy graduating in 1968 with a degree in Theoretical Mathematics. He did his final Navy tour as Chief of Staff for COMNAVBASE Pearl and retired from active duty in 1997.

Since retiring from the Navy he has held a number of positions supporting high technology development in Hawaii including Associate Director for Finance and Administration for the Maui High Performance Computing Center and as the first Director of the Mid-Pacific Branch Office of the Office of Naval Research. Since September 2007 he has served as the Director, Asia-Pacific Liaison for the Science and Technology Directorate of the Department of Homeland Security. The S&T

Directorate is looking beyond the US borders for innovative and effective solutions to combating terrorism and responding to natural disasters. In support of this initiative he coordinates a strategic program of focused and proactive international cooperative S&T programs and projects with governments, industry and academia. As a result of these efforts bilateral government to government binding Memoranda of Agreement are in place with Australia and Singapore and are in development in additional countries around the Pacific Rim.

Richard Kvale US Forest Service

Rich Kvale is Deputy Director of Fire and Aviation Management, USDA-Forest Service Washington Office National Headquarters. He spent six years in National Headquarter in various leadership positions in Fire Management, 36 years with the Forest Service in natural Resource Management Fire and Aviation Management and as a District Ranger.

He served in the South western Region on 2 National Forests and in the Pacific Northwest Region on one National Forest.

Phyllis Kreitz USFA Program Analyst

Phyllis Kreitz is a Fire Program Specialist, Emergency Response Support Branch, National Fire Programs Division, United States Fire Administration.

She is responsible for wildland/urban interface initiatives, working with Federal Wildland Agencies on the development of fire-adapted communities process, She is currently representing USFA on the National Wildfire Coordinating Group Wildland Urban Interface Mitigation Committee. She has had 34 years of federal service of which 31 years has been with the United States Fire Administration.

Noreen Krusel Bushfire CRC, Research Adoption Manager

Noreen has considerable research, policy and operational experience in the development and application of bushfire community safety programs. Noreen's Ph D looked at predicting fire activity and used decision tree analyses to investigate the relationships between various climatological variables and fire activity. She has 15 years of experience with a large volunteer-based fire agency – the Country Fire Authority - and has held roles in the community safety area with state leadership of fire prevention, land use planning, environmental management and structural fire safety and dangerous goods. She also has extensive experience in post fire analysis. Over the past two years Noreen's experience has been applied to assist all fire and land management agencies around Australia to bridge the gap between research and its effective application. She is also a member of a small rural community which has twice been impacted by bushfire over the past six years.

Lisa Langer Scion, NZ

Lisa Langer is a research scientist, Scion, Christchurch, New Zealand who leads the social fire research focusing on community resilience and recovery following wildfires in Scion's Rural fire research programme. She has led and participated in case study research of three fire affected communities in New Zealand, including one community in the rural-urban interface.

Justin Leonard CSIRO

Justin Leonard is a Bushfire CRC researcher leading CSIRO Sustainable Ecosystems' Bushfire Urban Design project. The work is delivering risk assessment tools and urban design solutions.

Justin's experience with experimental science indicates that people living in bushfire prone areas need to first accept the natural occurrence of bushfires, then effectively assess the risk these bushfires present. He joined CSIRO in 1993 and gained experience in the areas of materials flammability and fire test methods as well as combustion science and air quality. In the following years his research focus has moved to bushfire related infrastructure impact.

Grant Pearce Scion, NZ

Grant is a fire scientist with the New Zealand Rural Fire Research programme, based at Scion in Christchurch. He has 18 years experience in fire research, with fire behaviour modelling, fire danger rating and fire climatology forming the major components of his work. Grant led the NZ component of the Bushfire CRC shrubland fire behaviour experiments (Project FuSE), aiming to improve understanding of fire behaviour in shrubland fuels on slope. Grant was also a member of the Bushfire CRC fire behaviour research team reconstructing the spread of the Black Saturday fires in Victoria during February 2009, and also assisted with forecasting fire behaviour and spread during the 2006/07 Victorian bushfires.

Sarah McCaffrey USFS- Social dimensions

Sarah McCaffrey is a Research Social Scientist for the USDA Forest Service, Northern Research Station. Her research focuses on the social aspects of fire management. This work has included National Fire Plan and Joint Fire Science sponsored projects examining wildfire risk perception, social acceptability of prescribed fire and thinning, incentives for creation and maintenance of defensible space, and social aspects of biomass utilization. More recently she has begun work on the social issues that occur during fires – this includes examining alternatives to evacuation, homeowner intended actions during a fire, and understanding communication issues and public views of fire management during fires. In 2009 she assisted the Bushfire CRC with its post-fire data collection following the February 7th bushfires and subsequently was named a USDA liaison to the Victorian Bushfires Royal Commission. She received her PhD in Wildland Resource Science from the University of California at Berkeley where her research examined Incline Village, Nevada homeowner views and actions in relation to defensible space and fuels management. Beyond better understanding the public-wildfire interaction, Dr McCaffrey has an interest in the interaction of culture and resource management and in the development of effective outreach programs

Gary Morgan Bushfire CRC, Chief Executive Officer

Gary Morgan has spent over 20 years in senior land and fire management roles. As Victoria's Chief Fire Officer for Public lands, for over nine years, he was responsible for the management and deployment of fire suppression personnel. Following over a decade of developing international links, in 2000, Gary was responsible for the initiation and signing of a formal agreement between Australia, New Zealand and the US for the provision of firefighting support, staff exchanges and joint research. Since becoming CEO of the Bushfire CRC in mid-2007, Gary has worked to form a close alliance with the *Australasian Fire and Emergency Services Authorities Council* (AFAC) to foster strong relationships between researchers and the industry.

Milton Nenneman DHS S&T

Milton Nenneman is Director of First Responder Coordination for the Western US for Department of Homeland Security, Science and Technology Directorate. He is responsible for facilitating the identification of capability gaps from the nation's first responders (fire, law, EMS and

emergency management) to the S&T Directorate, primarily through the efforts of the Research, Development, Test and Evaluation First Responder Working Group. Its mission is to guide the identification, prioritization and development of mitigating technologies through the Integrated Product Team (IPT) process. Milt retired from the Sacramento Police Department as a Lieutenant in 2008 after twenty years of service.

Alan Rhodes Country Fire Authority, Victoria

Alan Rhodes Manager of Community Safety Research and Evaluation at the Country Fire Authority (CFA) in Victoria. He has been involved in research projects for the Bushfire CRC and CFA on community preparedness and response and he is currently a member of the CFA Royal Commission task force, working on strategic issues and policy.

Rob Rogers New South Wales Rural Fire Service, New South Wales

Assistant Commissioner Rob Rogers has been involved in fire fighting for more than 30 years. He has a strong operational background and has been an Incident Controller at many serious fires in both an urban interface environment, as well as remote areas. Rob's current position of Director Operational Services is responsible for leading the Rural Fire Service's capabilities to ensure that operational volunteers and staff are enabled to prevent, suppress and mitigate fires in rural fire districts across NSW. His responsibilities also include leading and directing the development and implementation of Community Safety policies, strategies and programmes to reduce risks and educate the community.

Bob Roper Fire Chief Ventura County.

Bob Roper is a 30-year veteran of the Ventura County Fire Department and a native of Ventura County.

He began his 30-year fire service career as a volunteer firefighter and promoted through the ranks to Fire Chief, which he's held for the past 12 years.

He has a Bachelor's degree in business, an Executive Fire Officer graduate and a Harvard Fellow.

Dave Sapsis Fire Behavior Science, CALFIRE

David Sapsis has over 25 years of experience in the field of wildland fire, with work involved in aspects ranging from fire effects resulting from prescribed fire, to large-scale mapping efforts designed to describe wildland fire and risk to natural resources and human assets. He has also served as a fire behavior modeler in support of large regional fire sieges. He currently serves as Senior Fire Scientist for Cal Fire in their Fire and Resource Assessment Program where he works on a variety of data, analysis, and strategic planning efforts Dave holds a Bachelors of Science degree in Forestry from UC Berkeley, an M.S. in Fire Ecology from Oregon State University, and is a PhD candidate in Wildland Resource Science at UC Berkeley.

Andrew Short Queensland Fire and Rescue Service

Andrew Short is a Chief Superintendent within the Queensland Fire and Rescue Service (QFRS). Over many years Andrew has contributed significantly to the development of Interface Zone (known as iZone within Queensland) capability within QFRS, covering both operational response and preparedness aspects. He managed the implementation of the Southern California designed iZone Risk Assessment Model (RAM) now in place within QFRS operational policy, and was the concept developer of the Wildfire Alert Level (WAL) system that now supports proactive QFRS preparedness

and response to iZone wildfire risk. In 2007, Andrew was awarded the Australian Fire Service Medal for his work in this and other QFRS operational areas. Currently in the role of Director of Professional Development, he is responsible for the conduct of professional development across QFRS.

Michele Steinberg FireWise Program-Nat'l Fire Prot. Assoc.

Michele Steinberg has worked on wildfire safety issues for the US National Fire Protection Association (NFPA) since 2002 and is currently manager of NFPA's Firewise Communities Program, an initiative designed to save lives and property from wildfire. Her duties involve developing resource networks for communities wishing to improve their ability to withstand fire in the wildland/urban interface, as well as research, writing and presentations. Key projects include managing the national Firewise Communities/USA Recognition Program, which reaches more than 540,000 residents of wildfire-prone communities in 38 states. She also serves as the staff liaison for NFPA's Technical Committee on Forest & Rural Fire Protection, which is responsible for standards on wildfire safety, including NFPA 1144, *Reducing Structure Ignition Hazards from Wildland Fire*.

An experienced speaker and presenter, Michele has worked since 1989 in the areas of natural hazards and land use planning, and disaster safety marketing and outreach

Scott Stephens UC Berkeley-Wildland Fire Science

Scott Stephens is Associate Professor of Fire Science and Co-Director UC Center for Fire Research. His experience has included being a Research Forester with the United States Forest Service Pacific Southwest Research Station, in Albany, California from 1995-1997, and a sabbatical in ACT, NSW, and Victoria Australia in 2008 working on fire in the urban wildland interface and in the wildlands.

Scott has given testimony before the US House of Representatives subcommittee on Forest and Forest Health and subcommittee on National Parks and Public Lands concerning the escaped prescribed fire at Los Alamos, New Mexico, in 2000. Also, before the US House of Representatives subcommittee on Forest and Forest Health on Recovering from the fires: restoring and protecting communities, water, wildlife, and forests in Southern California, 2003. And, testimony before the US House of Representatives Resources committee on the Sierra Nevada forest plan: protecting communities, water, wildlife, and forests in the Sierra Nevada in 2004.

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Doug Stone DHS S&T

Douglas Stone serves as a Program Analyst for the International Cooperative Programs Office (ICPO), US Department of Homeland Security (DHS) Science and Technology Directorate (S&T). He provides critical programmatic support to the "Pacific-Asia" and "Americas" portfolios by assisting in the expansion and management of international collaborative activities. Mr Stone also assumes a lead role in preparing the directorate's White House Reports and Monthly Executive Summaries which are distributed to key leadership. In addition, he provides key budgetary analysis to both portfolios by evaluating and advising on the effectiveness of program operations in meeting established goals and objectives.

Prior to his current responsibilities, Douglas served as the Director of Public Affairs at a national non-profit operating under the Department of Defense's "America Supports You" program.

Andrew Sullivan CSIRO Sustainable Ecosystems

Dr Andrew Sullivan is leader of CSIRO's Bushfire Dynamics and Applications team. He has been involved in bushfire research since joining CSIRO in 1991. He has a background in applied physics and computing and recently completed a PhD in competitive thermo kinetics and non-linear bushfire behaviour. He has been involved in a wide range of research projects, including the design of the CSIRO Grassland Fire Spread Meter and the CSIRO-Modified McArthur Mk 4 Grassland Fire Danger Meter, and the investigation of the behaviour of forest fires under dry summer conditions (Project Vesta). He has also been involved in the development of fire spread prediction software and models of radiant heat from bushfires, the study of wind and fire interaction and the investigation of spray protection systems for fire tankers. He is the co-author with Phil Cheney of *Grassfires: Fuel, Weather and Fire Behaviour* (2nd Edition published in 2008).

Richard Thornton Bushfire CRC, Deputy CEO and Research Director

Dr Richard Thornton is the Deputy CEO and Research Director of the Bushfire CRC a role he has held for six years. His responsibilities have included leadership and oversight of the research program for the research centre, ensuring research quality, research relevance, and up-take. Richard is a member of the Board of the International Association of Wildland Fire and the chair of the Editorial Advisory Committee of the International Journal of Wildland Fire. Richard also was the project director for the extensive research - data collection task-force project undertaken following the 7 February 2009 bushfires in Victoria.

Kevin Tolhurst University of Melbourne

Dr Kevin Tolhurst is a Senior Lecturer, Fire Ecology and Management, Department of Forest and Ecosystem Science, University of Melbourne, and a Bushfire CRC researcher. He provides expert advice on fire behaviour and fire suppression strategies at major bushfires. Some recent examples include the Black Saturday fires in Victoria in 2009, and the Great Divide Fires in 2007. Kevin has been involved in several inquiries and court cases involving fires. His current Bushfire CRC research activities are centred around developing a bushfire risk management decision support system. His research interests include: wildfire behaviour prediction; the development of prescribed burning techniques and guidelines; landscape scale fire ecology management; fire risk management, and; the ecological impacts of repeated fires.

Shane Wiseman Dept for Environment and Heritage, South Australia

Phil Veneris WUIFire Operations

Phill Veneris started his career in the fire service in 1984 on the central coast of California. He has been a volunteer firefighter, ambulance attendant, Hot Shot Squad Boss, Technical Rescue Team Manager as well as rising through the ranks of CAL FIRE to the rank of Battalion Chief. In his current assignment, he supervises a field battalion containing three wildland fire stations, two structural fire stations and a bull dozer. Phill has been a member of an Incident Command Team since 1998, working with both United States Forest Service and CAL FIRE Teams. Phill is a member of the CAL FIRE Wildland Urban Interface Working Group. This Working Group is providing short and long term direction to CAL FIRE regarding all aspects of WUI incidents as well as writing a training handbook for internal and external use.

Lyndsey Wright Bushfire CRC, Research and Education Manager

Lyndsey is Research Manager at the Bushfire CRC. This is a newly created role recognising the importance of effective management of the complex research program for the Bushfire CRC Extension to 2013. Lyndsey was seconded to the Bushfire CRC from the Metropolitan Fire and Emergency Services Board where she had held the role of Manager Planning and Research for nearly 10 years. During her secondment Lyndsey held the role of Acting Research Director and contributed to the bid for the CRC Fire Environment and Society, in particular considering the economic impact of bushfire research. Lyndsey has a background in economics and planning and management.

Agenda

Time	Topic	Speaker/Contact	Time
Day 1 Monday 14 June 2010			
9:00am – 10:00am	Arrival Tea & Coffee		
10:00am – 10:10am	Chair / Opening	Gary Morgan	0:10
10:10am – 10:40am	Expectations	DHS; PM&C; Gary Morgan	0:30
10:40am – 11:00am	Brief Intros	All	0:20
11:00am – 11:15pm	Australian Fire Organisation	Naomi Brown	0:15
11:15am – 11:30pm	US Fire Organisation	Rich Kvale	0:15
11:30pm – 12:35pm	Black Saturday intro	Gary Morgan	0.05
11:35pm – 11:55pm	Overview	Ewan Waller	0:20
11:55am – 12:05pm	Questions		0.10
12:05pm – 12:50pm	Lunch		0:45
12:50pm – 1:05pm	Recovery	Craig Fergusson	0:15
1:05pm – 1:15pm	Research	Richard Thornton	0:10
1:15pm – 1:30pm	Royal Commission	Gary Morgan	0:10
1:30pm – 2:00pm	US example	Chris Dicus	0:30
2:00pm – 2:15pm	Fire behaviour – Aust	Liam Fogarty	0:15
2:15pm – 2:30pm	Fire behaviour – US	David Sapsis	0:15
2:30pm – 2:50pm	Afternoon Tea		0:20
2:50pm – 3:05pm	Risk/Planning – Aust	Rob Rogers	0:15
3:05pm – 3:20pm	Risk/Planning – US	Bob Roper	0:15
3:20pm – 3:35pm	Community Safety – Aust	Alan Rhodes	0:15
3:35pm - 3:50pm	Community Safety – US	Jack Cohen	0:15
3:50pm – 4:-05pm	Tour – outline of Tuesday tour	Alan Rhodes, Liam Fogarty	0:15
4:05pm – 4:15pm	Wrap up/ Housekeeping	Richard Thornton	0:10
4:15pm	Close		
5:00pm – Bus pick up from the Metropole Hotel to Eureka Towers Sky Deck			
5.30 -6.30pm Eureka Towers Sky Deck. Walk to Melbourne Aquarium			
7:00pm – 10:00pm – Hosted Dinner – Melbourne Aquarium (Dress Code: Jacket and Tie)		Hosted by Bushfire CRC	

Day 2 **Tuesday 15 June 2010**			
08:30	Bus pickup from the Metropole for tour	Kinglake/Marysville/ Dandenong Ranges. Hosted by Victorian agencies – DSE and CFA.	
5:00pm	Return to Metropole Hotel		
5.45pm	Walk to Fire Services Museum, 39 Gisborne St, East Melbourne		
6:00pm – 9:00pm.	Hosted Dinner – Metropolitan Fire Brigade (BBQ –Dress Code: Casual)		

Day 3 **Wednesday 16 June 2010**			
7:00 – 7:30am	Check out from Metropole Hotel		
07:30 – 9:20am	Bus pickup from the Metropole and travel to Melbourne Airport for flight to Canberra		
09:20 – 10:25am	QF 2132 Flight Melbourne to Canberra		
10:25 – 10:45am	Arrive Canberra		
10:45 – 1:30pm	Bus field trip to 2003 Canberra fire areas – warm/waterproof casual clothing required – lunch on tour	Hosted by ACT Fire Services	
1:30 – 2:00pm	Tour finishes at Rydges Capital Hill Hotel		
1:30 – 2:00pm	Check in at Rydges Capital Hill Hotel		
2:00	Arrival Tea and Coffee		
2:00 – 5:00pm	Three breakout sessions Fire Behaviour Buildings/ Risk Management Community Safety	What is known/State of the art	
5:30pm	Bus Rydges to Old Parliament House		
6:00pm - Drinks. Hosted by Dept of Attorney General and Bushfire CRC. Old Parliament House. 18 King George Terrace, Parkes. Canberra. Dress: Jacket and Tie 7:00pm - Dinner			

Day 4 Thursday 17 June 2010			
8:30am	Bus to Parliament House		
9:00am – 5:00pm	Meeting Parliament House Canberra – Senate Room 2S3 (Dress Code: Jacket and Tie)		
AM	Continuation of breakout groups	Discussion on gaps: Before, During, After an event	
12:30pm - 1:00pm	Lunch		
PM	Three breakout groups + feedback session	Feedback and discussion from groups	
5:00pm	Bus return to Rydges Hotel		
6:30pm - Hosted Dinner – Hosted by ACT Fire Services. Le Rendezvous Restaurant, Manuka. Walk to/from venue.			

Day 5 Friday 18 June 2010			
7:30 am – 8:30am	Checkout of Rydges. Store luggage		
08:30am - 12:00pm	Meeting Rydges Final feedback and agreed next steps		
12:00pm – 1:00pm	Lunch		
1:00pm	Bus pickup from hotel: International guests for travel to Sydney Airport (3-1/2hrs)		

Tours

Two tours were arranged to ensure all delegates had a broad understanding of the fire situation in the Australia to areas were chosen to represent the differing nature of interface fires in recent years in Australia.

- The Kilmore and Murrindindi fire regions from February 7th 2009 fires
- The Duffy and Chapman areas of Canberra from the January 18th 2003 fires

Field trip Black Saturday fires

Field Trip Canberra fires

Tour Itinerary: Bushfire CRC – USA Tour 15 June 2010

Time	Destination	Issue	Lead	Support
8.30am	Leave Metropole Hotel – Fitzroy			
8.30am – 9.40am	Travel to Kinglake			
9.40am – 9.50am	Travel to Sugarloaf			
9.50am – 10.20am	Stop at Sugarloaf	1. Description of Fire	Nic Gellie	J Gould Kevin Tolhurst
10.20am – 10.30am	Travel to Kinglake			
10.30am – 11.00am	Stop at Kinglake CFA Brigade	**Morning Tea**		
11.00am – 12.30pm	Travel to Marysville			
12.30pm – 1.00pm	Stop at Marysville CFA	Personal experience of 2009 fire	Greg Williamson CFA Representative	
1.00pm – 1.30pm	Stop at Marysville Bakery	**Lunch**		
1.30pm – 2.30pm	Stop at Marysville DSE Regional Office	1. Planning 2. Community Safety	Alan Rhodes	Justin Leonard CFA Representative Joshua Whittaker
2.30pm – 3.00pm	Travel to Healesville			
3.00pm – 3.45pm	Travel to Dandenong Ranges			
3.45pm – 4.15pm	Stop at the Dandenong Ranges	Current setting Risk Issues Fuel Reduction Burns	PV/DSE – Grange Jephcott CFA Representative	
4.15pm – 5.00pm	Travel to the Metropole Hotel – Fitzroy			
6.00pm	**BBQ MFB - Museum FIRE SERVICES MUSEUM 39 Gisborne Street East Melbourne**			

Meetings

Meetings and discussions were held on Monday, Wednesday, Thursday and Friday. These were of two types

- The Monday meeting was a series of presentations from Australia and USA to familiarize those present on the fire and interface issues in each country.
- The remaining meeting comprised facilitated workshops aided at getting an understanding of where research gaps existed and where the two countries could usefully work together.

Networking

An integral element of the five days was to create lasting relationships between the US and Australian participants. In order to achieve this plenty of time was allocated to lunches and breaks during the day. Also hosted dinners were an integral part of the planning, these were planned to coincide with key elements of the meeting progress.

Chris Doyle (DHS), Naomi Brown (AFAC), Gary Morgan (Bushfire CRC), Michael Thurston (US Consul General), Len Foster (Bushfire CRC)

Len Foster addressing dinner at Melbourne Aquarium

David Atkinson (US Embassy) addressing dinner at old Parliament House

Process

Australia-USA Symposium on Fires at the Interface Breakout Group Sessions - A Guide

Stage 1: (Wednesday) Evaluation of state of the art: an understanding where everyone is at.

- Each person to highlight area of expertise and current work. (Important all speak)
  - What is felt to be well known and why?
  - Where are there are gaps (in the context of before, during or after and event)?
- Do we all concur that what is stated to be know is in fact known?

Stage 2: (Thursday) Given the state of the art, what are the gaps?

- Before (planning), During (response), After (recovery) an event?
- Do we all agree that the areas identified as gaps are gaps?
- Does anyone know of research that fills these gaps?
- For each of the gaps prioritise (High/Medium/Low) and determine if it is a puzzle or paradigm problem?
- What would the research questions be to address these gaps?
- How do we bring our collective knowledge (including the knowledge of those not present) to bear on these questions?

Stage 3: (Friday) Feedback; plenary; leading to agreed next steps

Formal presentation from each group

- Key discussion points(agreed knowledge /gaps)
- Priorities and next steps from sub-groups

Whole group's consensus on priorities for further action.

This process was challenging for all concerned as it placed people in an uncomfortable position in having to articulate what was known and unknown. By the end of the first day many were feeling ill at ease, this worked in well with the hosted dinners where further discussion we held.

The white boards and butcher's paper used in the discussions were all captured and transcribed.

Groups

The participants split into small working groups based upon interest and expertise. The initial grouping was **Fire Behaviour; Interface planning, risk management/building construction; Community safety** these group were allocated a facilitator and these were Liam Fogarty, Mark Chladil, and Noreen Krusel respectively. It was as a result of the tireless efforts of each of these that the required outputs were achieved. The group sessions were held in the Australian Parliament House, on the Thursday and at the Rydges Hotel on the Wednesday and Friday.

Some of the notes and Butcher's paper comment scan be found in **Attachment 1** and the final version of the research proposals can be found in **Attachment 2**

Each of these groups split into smaller groups to develop the final proposals

Working group Parliament house

Working group Parliament house

Feedback session Rydges Canberra

Next Steps & progress since meeting

The agreed next steps from the workshop was that DHS and the Bushfire CRC seek appropriate funding mechanisms to support the international collaboration on an opportunistic basis.

On the Australian side, the work has been used to help to define projects in the national Fire Danger Rating System review and research plan, which is expected to be funded through the Attorney General's Department. The Housing vulnerability work has been used to help to formulate a bid to the Attorney General's Disaster Mitigation Program by AFAC.

Day 1

Outcome

Knowns

Suppression Activities limitations in extreme situations

Compliance – Assumptions by agencies (Message)/actions etc.

Warning evacuation research - how people will respond

Factors on what shapes peoples decisions to mitigate

Models of information – social marketing

Fire management historically

Community expectations context

Scale of data

- wildfire changes
- system changes

- changing trends

Various options are viable in certain conditions

- evacuation
- Stay and defend/shelter in place/ ready set go!

Outcome Minimise negative impacts in the WUI by understanding human dimensions

Unknowns

Effectiveness of information models and divergence of cultural values

If behavioural change is possible

If best practices/polices transcend both countries

Community expectations

Frequencies of occurrence

Risk avoidance/acceptance profiles

Individual decision making factors

How significant is individual decision making in response to risk

If stay or go is the right policy or if mechanism failed

If improved situational awareness by public would affect decision making

How broad does public policy apply

Circumstances of RSG/SGD options

Behaviours w/event

Community reaction – b/d/a

Protecting people, assets communities, buildings

Partnerships with officials and community members

Building- People affect

Agency interaction/ action scales

Enable decision makers – Social media – real time- understanding capabilities/expectations tp people/messages

Risks /perceive

How to communicate to people

Issues around SGD or go how given situational awareness

Community resiliency

Human behaviour – Agencies; people; interaction; expectations – Personal responsibility

People response to risk – Public taking action; Environment

Policy

- Community capacity
- Roles – community; agency; individuals

Human behaviour variability

People focus of solution – how to affect message to change behaviour

Preparedness of community

What is a safe community? - Capable of protecting self and those who cannot help themselves:

- Resilience
- Enhance community/people protection

Individuals; households; community; agencies/organisations; responders

Community Resilience

People& Behaviours

- Choices/actions
- Messages

Risk analysis & Perceptions – response/actions

Why are people doing what they are doing/ why are they making the choices they do?

Vulnerabilities

Communication-education- influence

Day 2

Problem Areas:

- Viability of Protective Actions (Before & During Fire) (11 votes)
    a. Limited understanding of the circumstances in which different strategies are viable (level of preparedness, capacities and resources of residents, fire weather/behaviour, etc)
    b. Protective actions efficacy depends on circumstances which vary – how can public deal with this complexity?
    c. What options are possible (when), optimal (when) and for whom?
    d. Is there a simple decision making model for public use during dynamic situations?
    e. Understanding community preparedness actions/inactions to ensure effective preparation and response during fire events.
    f. Assuming no change in built/natural environment how to increase % of "optimal" advice/actions being taken based on accurate knowledge of current situation – empower individuals to take informed, effective action.
    g. Applicability of Stay and Defend and Ready, Set, Go! to different conditions.
    h. How to influence the community to pre-plan and decide "early" to reduce the decision making "on the day."

i. Criteria for which action to take when unclear.
j.

- Psychological Impacts (3 votes)

a. Can people's psychological readiness be enhanced so they can deal more effectively with fire threat
b. How to enhance psychological factors for community resiliency (post event)?
c. What is needed to return firefighter and citizen back to the pre-incident condition?
d. Understanding psychological impacts on communication as input to planning/motivating adequate community preparedness.
e. How to prepare the community for what to expect and what they will experience?
f. How long – how hard can we work responders? How to increase/enhance individuals/communities psychological capacity before-during-after?

- Situational Awareness (8 votes)

a. How do people understand/interpret information about the fire situation and transfer this information appropriate action.
b. How to translate awareness into action? (e.g. get people to respond to information/warnings in a timely manner.)
c. Who needs to know what and when? Fire Responders /Public
d. Clear understanding of the threat, where it is and the likelihood of where it is going. Who is threatened and where are they?
e. Improve accuracy and availability of fine-grained and course-grained (multi-level) situation awareness for personalized advice and risk-based decision making by citizens and first responders (specifically at WUI)
f. How to keep the community informed and engaged before-during-after the incident?
g. Clear understanding of Situational awareness by responders is not in place.

(1) Information –
(1A) Deliver
(2) Understand
(3) Act

- Occupational Health and Safety (3 votes)

- How do we limit the physical effects of the wildland emergency?
- The training and equipment and technology needed to protect the life and breadth of the responder from the wildfire threat.
- Occupational Health and Safety of communities during and following fire event.
- Enhance performance and reduce likelihood of injury, etc. through reduced physiological stress = improved PPE and operating practices. How to make WUI survivable with less risk/involvement of first responders.
- How to promote (and influence) individual responsibility vs reliance on expectations Firefighters and public and health safety
- We cannot account for responders as well as we should.

Analyze and minimize health and safety of wildland fire to firefighters and public.

- Decision Making (Responder and Citizens) (8 votes)
  - How to get more effective decision in situations of risk and uncertainty?

- How do non-cognitive factors influence decision-making?
- How to improve First responder – public collaboration?
- What info and technology is needed to help first responder and policy makers make decision quickly and effectively?
- Understanding cues for communities to make decisions to prepare and follow appropriate action prior to and during fire event.
- Understanding how people in the WUI respond to different conditions-information?
- Predict what people (WUI) will do (pre-fire and during)?
- How to engage and promote individual decision making responsibility prior to the event?

How people make decisions and how to design information to improve/enhance decision-making?

Community Safety Group Members:

Noreen Krusel	Andrew Short
Phyllis Krietz	Tom Foley
Tom Cova	John Colton

Lisa Langer Alan Rhodes
Sarah McCaffrey Bob Roper
Scott Stephens Josh Whitaker
Shane Wiseman
(Randy Griffin, Iftah Gideoni)

Approach/Methodology – Our journey:

<u>Day One</u> –
Scoping out & defining our 'space'
Brainstorm – each person
Group discussion (active!!)
Developed Outcome Statement – "Minimise negative impacts in the WUI by understanding human dimensions of (preparing for)response to wildfire'
Much discussion around the breadth of the scope – Community safety or resilience?
Knowns & Unknowns – had a lot of trouble – disagreement on what was known & what wasn't. Stuck in detail but finally lifted out of the weeds and looked at more holistic approach to what transcended the Pacific.
<u>Day two</u> -
Unknowns became our gaps, and injection of Bob's list of potential re4searchs questions

sharpened our focus and we quickly identified 'problem areas'.

We developed five problem areas

- Viability of protective actions (before & during fire)
- Psychological impacts
- Situational awareness
- Occupational Health & Safety
- Decision making (responders – citizens)

In all areas we agreed that responders may be fire fighters as well as community members

Individuals took time to write down their own description of the problem area, these were written up and a group discussion was held to derive an agreed statement of the problem area.

We then voted as then to which were the priorities to pursue to develop into the research proposal.

The voting was as follows:

- 11 - Viability of protective actions (before & during fire)
- 3 - Psychological impacts
- 8 - Situational awareness
- 3 - Occupational Health & Safety

- 8 - Decision making (responders – citizens)

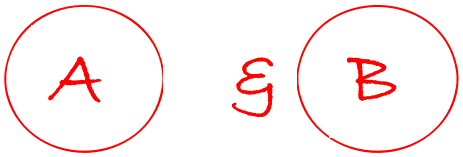
After lunch people indicated support for developing two of these, Viability of protective actions and Situational awareness with decision making not having a clear leader but agreement to consider by the situational awareness group.

Left with two groups who developed the proposals you will now hear about:

Tom/Scott/Alan – Viability of protective actions (before & during fire)

Bob/Andrew - Situational awareness (&Decision making).

1) DEFINE PROBLEM



2) CHARACTERIZE EXTERIOR EXPOSURE & BUILDING IGNITION

3) QUANTIFIED ASSESSMENT

4) IGNITION RESISTANT ASTM ISO METHOD MATERIAL / ASSEMBLY TEST

5) FIRE SUPPRESSION
   - Homeowner defensive actions
   - Fire fighter actions
   - Built-in systems (NFPA 13-D)

6) Fire in the Broader Policy & Planning Environment

(WUI Cont. ??)

* Chain of events leading to loss 1)

*Chance of catastrophic loss and the cost 2)

* Define Worst Case Scenario (metrics) 2)

* Effectiveness of Voluntary Actions 3)

* Maintenance of Safety Measures

* Real World Performance 2)

* Define WUI 1)

* Built-In Suppression Systems (sprinklers / landscaping) 5)

* Role of Local Government 3)

- How can elements of home vulnerability be quantified / rates effectively?
- How do you define cost of WUI disasters & who pays?
- Method for defining / quantifying potential effectiveness mitigation treatments:
    - Property retrofit – passive / active
    - Landscape modification
    - Stay / go behaviour
    - Homeowner defensive action etc.
- How can Fire fighters be trained to quickly & effectively assess defendability of structure at time of fire? (what tools available?).
- How can you develop a method for mitigations to be better integrated with am values?

- What are ongoing maintenance & monitoring requirements to ensure safety levels (home)?
- Best practices to "institutionalize" local practice / knowledge (user manage)
- How to express probability of catastrophic home loss? At what scale is this info important?
- How do you define cost to the community of loss / protection?
- How can FDS agencies / fire services effectively predict the need for proportional response?
- How can we expand the home vulnerability assessment to street or development level to assess community vulnerability to ignition?
- What are the key, replicable elements of a post-fire disaster assessment protocol?
- What mode of OZ / US collaboration can be effective?

– What process is sufficient to validate the defined test methods? (Ignition resistant materials)

(B) METRICS

- Post-Fire Survival (relative to burned)

- Basic "Fire Report" data collection
  Post Disaster
  (Real Time)
  International Data Studied
  FEMA / NFPA, NFIRS, AIRS

- Case Study Methodology

- Comprehensive detail "damage survey"

(Policy Areas?)

* TRANSFERING KNOWLEDGE BETWEEN PLANNERS AND DEVELOPERS & FIRE PEOPLE 6)

* INTEGRATING WITH OTHER POLICY ISSUES 6)

* RECOVERY PLANNING 6)

(2) * Sprinklers & other aids

(2) *Ongoing effectiveness of voluntary actions

metrics

* Planners & Developers Knowledge

Vs

Link to Forum

Fire Science

metrics

.. Maintenance of Safety Measures

(3) * Role of Landscaping

(3) * Role of Local Government

* Post fire analysis protocol (real world perf.)

metrics

ITEM:

*Define Worst Case Scenario 5)

*Process for turning knowledge into standards 2)

* What is the risk of a catastrophic loss and the cost 2)

* Chain of events leading to loss is poorly understood

* Metrics for success

Define prob.

* Intersection with other policy issues / main-stream

WUI? WUI?

* Define Worst Case Scenario 5) Metrics

* Characterize WUI

* Built-In Suppression Systems 2)

ITEM:

CHARACTERIZING THE INTERFACE FIRE PROBLEM

(A)

DEFINITION & MEASUREMENT OF SUCCESS (B)

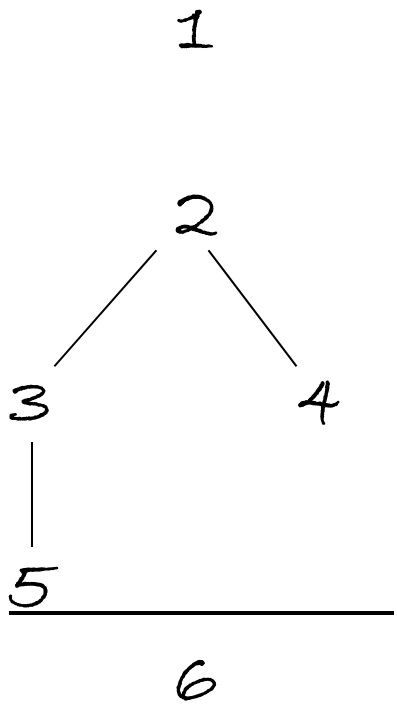
(A)

- 1974 "C.P. Butler" Def.
- Disastrous Home Loss (90%)
- Fire Prot. Overwhelm

- Exterior Fire Exposure

- Building Ignition

* DATA LEGACY



(Concepture)

Definition - Define & describe the

relationship between wildfire exposure from flames & firebrands and structure ignition.

HOME VULNERABILITY ASSESSMENT TOOL

Delivering the tool that defines likelihood of home survival and the appropriate mitigation measures and their relative effectiveness.

Under Debate

- Fuel Characterisation for ember production

- Study fire behaviour in comparative manner / framework that will inform the effects of climate change

Parking Lot

- Predictive modelling : Extreme vs "Normal"
- Real time S.A. of fire behaviour for decision makers

Contribution of houses to interface fire spread

Unknown

1. Describe the potential for detrimental / beneficial impact on Community / Environment
    - Thresholds
2. Quantification of ember production, characteristics and transport – source & duration
3. What do you have to do to fuel management to reduce fire energy
    - Spatial and temporal
4. Scalable fuel characterisation (to include homes)

Unknown cont...

5. Optimizing asset protection zones to reduce risk

6. How do you describe the "active" fire area? (convective footprint)

7. High resolution meso scale atmospheric model for fire behaviour

Problem

Prediction and communication of potential consequence.

To whom? Policy makers, operational decision makers ("responders"), communities.

Over what temporal / spatial scales?

Able to quantify and take account of rate of change bounds of confidence.

Research Questions

1) Sensitivity of "system" (Potential impacts) to Biophysical, operational / response drivers & community attributes?

2) Improved characterizations of key inputs that constitute these drivers & attributes? What needs improvement?

3) Can we construct a profile of fire potential (e.g. critical thresholds) that lead to extreme consequences?

Project Themes / Projects

Priority:

A 1) Improvements to characterizing dynamics & scale of fires using diverse modelling & empirical approaches.

Key components:

- Ember density & transport
- Area footprint – energy release
- Transitions in fire development (non-linear) & corresponding implications for "response" (FF safety, initial attack, community safety)
- Transitions across fuel types including the urban / wild boundary.

Priority:

$millions

B 2) Modelling of biophysical attributes to inform 1) and predict consequence at appropriate spatial & temporal scales to develop a full understanding of fire potential.

C 3) Develop a fire consequence rating system to replace current FDR systems that are targeted to suit patterns of development & regional characteristics.

$100'sK

D4) Modelling of response likelihood (probability of success) with daily / model / scale to support decision-making during operations:

- Resource capability & type
- Evacuation

- Communication capability

$100'sK

Measures of Success

1) Less false alarms – better targeted warnings → ↑ Confidence in decision making & public response

2a) Increase suppression effectiveness

2b) Reduced (relative) suppression costs and/or losses – measured response

3) Better intelligence for Mgt & public & responders

COMMUNITY

AGENCY

4) Enhance landscape manageme to reduce risk / losses (social, environmental, economic)

5) Better able to target expenditure based on cost / benefits

LONG TERM STRATEG..

Benefits of Collaboration

1) Combination of data rich empirical data with strong skills

2) Broader knowledge / skill / experience base to deliver research outcomes quicker

3) Combined fire environments captured to help develop more universal models / systems (biological, meteorological, terrain)

4) Greater benefit to responders in international exchange (training, models, system) based on research

5) More attractive to harness "external" skills & resources:
   - Avoid duplication
   - Broader acceptance
   - Critical mass – cost effective
   - Better critical thinking / brain power

6) Ability to attract additional resources funding through international collaboration

Resources

Skill Sets

Plume - Atmospheric physics / Convection, meteorologists

Embers - Combustion & flight

Fuel - Combustion process / residence time

- Fuel moisture
  - live
  - dead
  - fuel types

Modelling - Statistical

- Operational
- Programming

GIS / Remote Sensing

Program management

Fire Behaviour

(Collaboration with impact modellers)

Physical

Computing power (super computer)

Wind tunnels / fire labs

Environmental chamber (fuel)

IR Scans, experimental data

validation sites (field, based on data gaps)

Fire Behaviour

Land Owner
Shared Responsibility
Fuel Management
Land

Comm

Owner

Scaling of Event
Small to Extreme

Weather in combination with fuel management

Pre Planning Fire Suppression
"Standard" Op. Procedure

Define Fuels –

Characterize weather patterns

Define "energetic" of fire

Problem of house being destroyed as function of fire:

Start – Ignition
Encroaching
Spreading
Total

Fire / Fuel Encroachment fuel available In WUI

S.A. With predictive models for:
Extreme weather

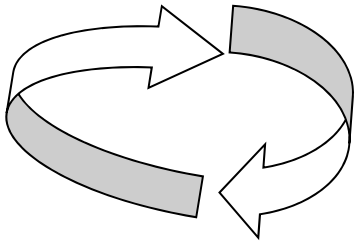
Scale: Landscape – parcel
Vortex
Ember production
At the WUI -
Asset protection

Fire Prevention

Decision support to community understandable

Known - Comfortable

Situational Awareness for Large Scale Disasters



THEME

Dynamic

CURRENT

Observations
Social media

? How to convert data → into → knowledge

Dynamic

PREDICTION

Models
- fire
- people
- assets
Etc...

Consequences
- Response
met etc. / fuels
People behaviour
? Fire / Fuels

Dynamic

OUTPUT

Communication
Decision Making
- Comm
- assets
- O.M. Agency

? How to convert "situation map" for "human consumption" (interpretability)

SCALABLE

modelling (target users / audience)

DELIVERABLES

OPERATIONAL INTEL - (Real Time)

AGENCIES (GIS)

COMMUNITY (Web)

INDIVIDUAL (Text)

PRE - INCIDENT

K - OF:COMMUNITY AWARENESS

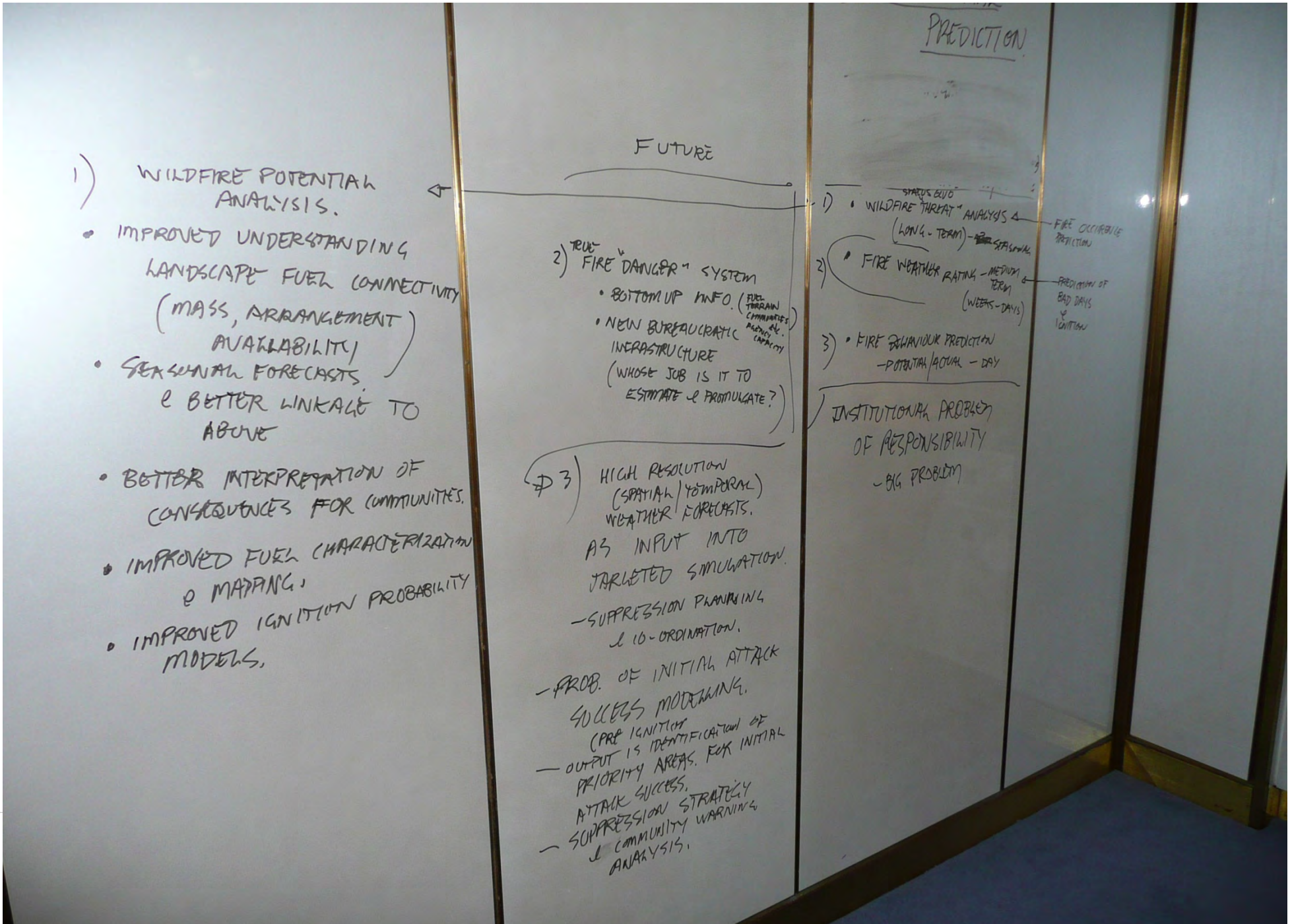
DATA FILL

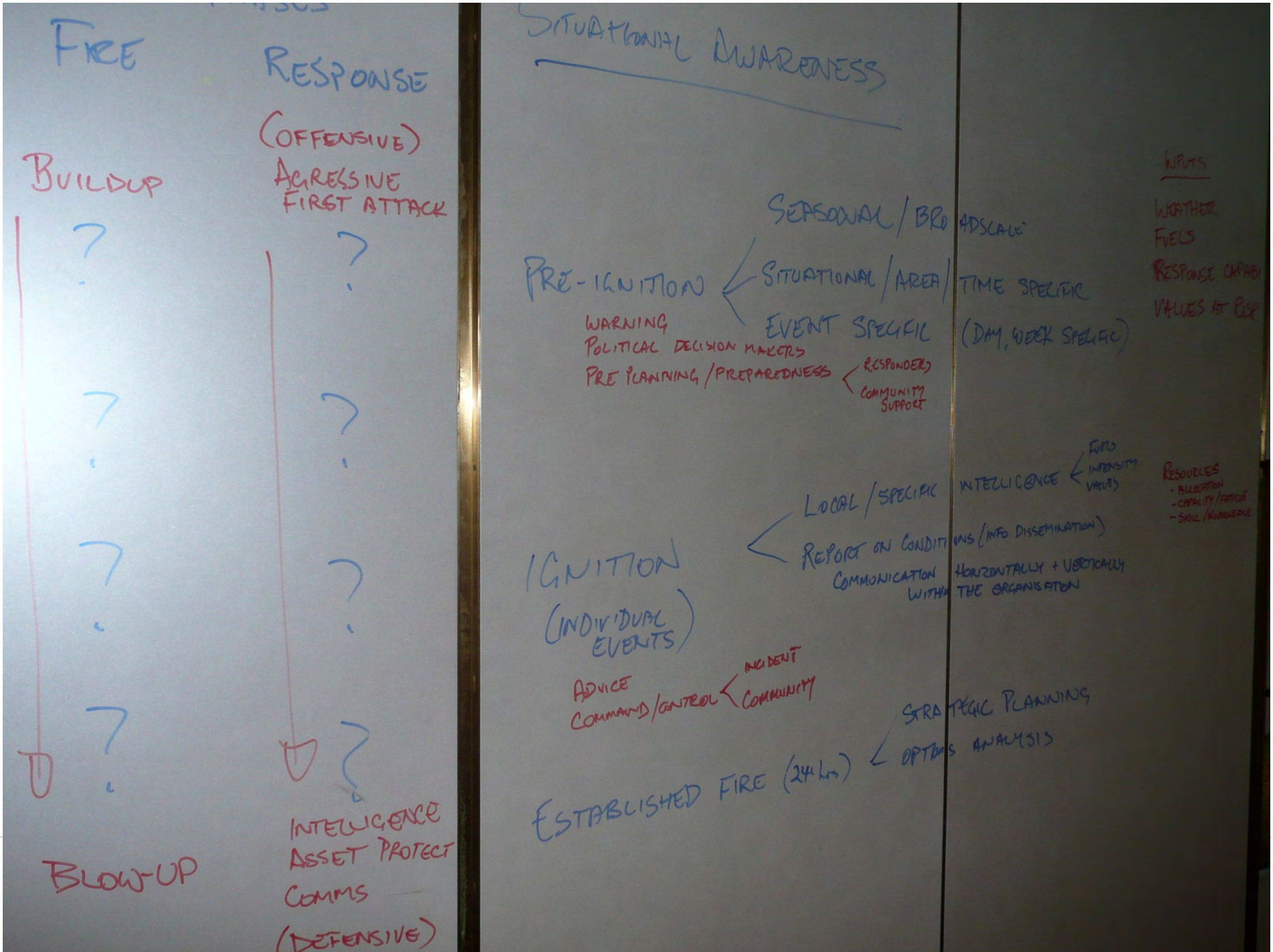
SIMULATIONS

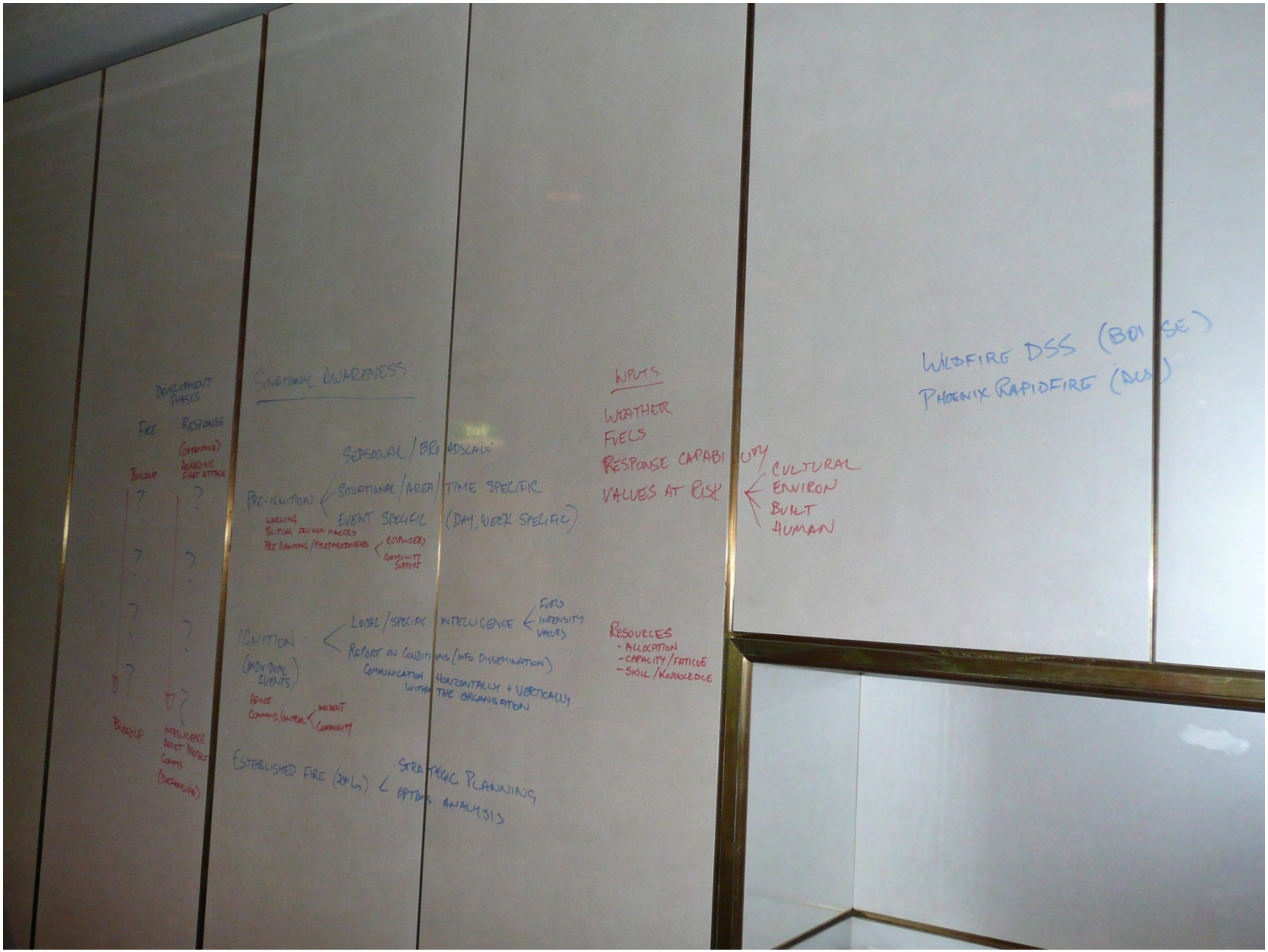
TRAINING / EXERCISE

MULTI-HAZARD

FIRE - FLOOD Etc.


PREDICTION
FUTURE
1) WILDFIRE POTENTIAL ANALYSIS.
• IMPROVED UNDERSTANDING LANDSCAPE FUEL CONNECTIVITY (MASS, ARRANGEMENT AVAILABILITY)
• SEASONAL FORECASTS & BETTER LINKAGE TO ABOVE
• BETTER INTERPRETATION OF CONSEQUENCES FOR COMMUNITIES.
• IMPROVED FUEL CHARACTERIZATION & MAPPING.
• IMPROVED IGNITION PROBABILITY MODELS.
2) TRUE FIRE "DANGER" SYSTEM
• BOTTOM UP INFO. (FUEL TERRAIN COMMUNITIES AL. AGENCY CAPACITY)
• NEW BUREAUCRATIC INFRASTRUCTURE (WHOSE JOB IS IT TO ESTIMATE & PROMULGATE?)
3) HIGH RESOLUTION (SPATIAL/TEMPORAL) WEATHER FORECASTS.
AS INPUT INTO TARGETED SIMULATION.
– SUPPRESSION PLANNING & CO-ORDINATION.
– PROB. OF INITIAL ATTACK SUCCESS MODELLING. (PRE IGNITION)
– OUTPUT IS IDENTIFICATION OF PRIORITY AREAS. FOR INITIAL ATTACK SUCCESS.
– SUPPRESSION STRATEGY & COMMUNITY WARNING ANALYSIS.
STATUS QUO
1) • WILDFIRE "THREAT" ANALYSIS (LONG-TERM) – SEASONAL
FIRE OCCURRENCE PREDICTION
2) • FIRE WEATHER RATING – MEDIUM TERM (WEEKS-DAYS)
PREDICTION OF BAD DAYS & IGNITION
3) • FIRE BEHAVIOUR PREDICTION – POTENTIAL/ACTUAL – DAY
INSTITUTIONAL PROBLEM OF RESPONSIBILITY – BIG PROBLEM


FIRE
RESPONSE
(OFFENSIVE)
BUILDUP
AGRESSIVE FIRST ATTACK
BLOW-UP
INTELIGENCE
ASSET PROTECT
COMMS
(DEFENSIVE)
SITUATIONAL AWARENESS
SEASONAL / BROADSCALE
PRE-IGNITION
SITUATIONAL / AREA
TIME SPECIFIC
EVENT SPECIFIC
(DAY, WEEK SPECIFIC)
WARNING
POLITICAL DECISION MAKERS
PRE PLANNING / PREPAREDNESS
RESPONDERS
COMMUNITY SUPPORT
INPUTS
WEATHER
FUELS
RESPONSE CAPAB
VALUES AT RISK
LOCAL / SPECIFIC
INTELIGENCE
FUELS
INTENSITY
VALUES
RESOURCES
- ALLOCATION
- CAPACITY / FATIGUE
- SKILL / KNOWLEDGE
IGNITION
REPORT ON CONDITIONS (INFO DISSEMINATION)
COMMUNICATION WITHIN
HORIZONTALLY + VERTICALLY
THE ORGANISATION
(INDIVIDUAL EVENTS)
ADVICE
COMMAND / CONTROL
INCIDENT
COMMUNITY
STRATEGIC PLANNING
OPTIONS ANALYSIS
ESTABLISHED FIRE (24 hrs)


SITUATIONAL AWARENESS
INPUTS
WEATHER
FUELS
RESPONSE CAPABILITY
VALUES AT RISK
CULTURAL
ENVIRON
BUILT
HUMAN
WILDFIRE DSS (BOISE)
PHOENIX RAPIDFIRE (ADS)
DEVELOPMENT PHASES
FIRE
RESPONSE
BUILDUP
SEASONAL / BROADSCALE
PRE-IGNITION
SITUATIONAL / AREA
EVENT SPECIFIC
TIME SPECIFIC
(DAY, WEEK SPECIFIC)
RESPONDERS
COMMUNITY SUPPORT
IGNITION
(UNPLANNED EVENTS)
LOCAL / SPECIFIC INTELLIGENCE
FUELS
INTENSITY
VALUES
REPORT ON CONDITIONS (INFO DISSEMINATION)
COMMUNICATION WITHIN THE ORGANIZATION
HORIZONTALLY + VERTICALLY
RESOURCES
- ALLOCATION
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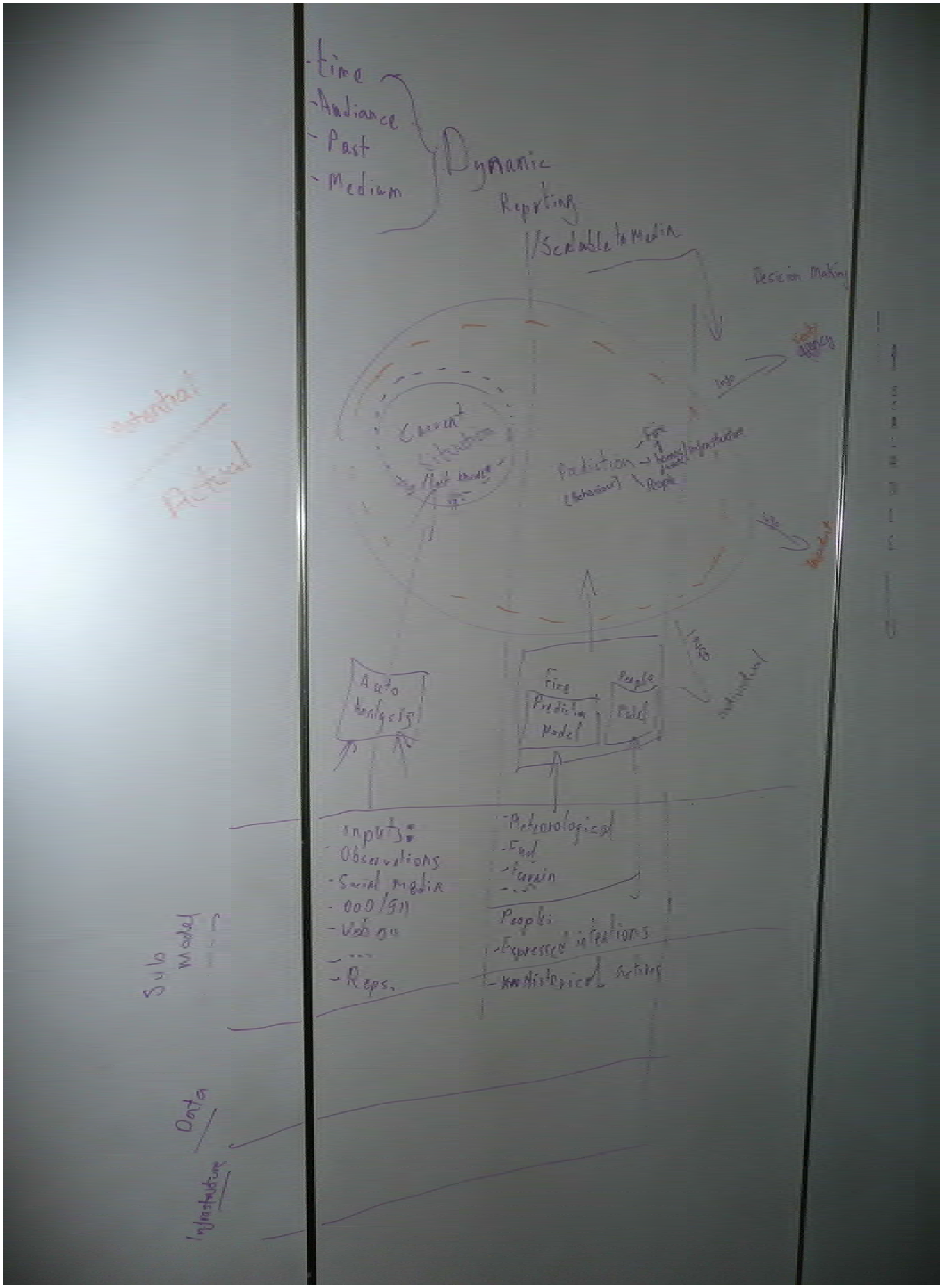
RESIDENT COMMUNITY
ESTABLISHED FIRE (24 hr)
STRATEGIC PLANNING,
OPTIONS ANALYSIS


-time
-Audiance
- Past
- Medium
Dynamic
Reporting
//Scalable to Media
Decision making
Current
Solution
Prediction
Auto
Analysis
Fire
Prediction
Model
People
Field
inputs:
- Observations
- Social media
- GIS
- Web
- ...
- Reps.
-Meteorological
-Fuel
-Terrain
People
-Expressed intentions
-Historical setting
Sub
model
Data
Infrastructure

Appendix 2: Research Proposals

The following research proposals were collected at the end of the sessions.

Situational Awareness of FirE (S A F E)

Problem

- Inadequate means to predict and communicate the "potential" of bushfire/wildfire (i.e. intensity, size, chance of reaching property). This ultimately shapes the consequence.
    - To whom is this important? (Policy makers, operational decision makers, responders, communities)
    - Over what temporal / spatial scales? yearly/seasonal, monthly, daily, hourly: regional, landscapes, towns/suburbs, buildings
- Inability to quantify and take account of rate of change in fire 'situation' (before and during a fire)
- A need to describe the bounds of confidence in predictions and warnings and their ultimate consequences
- Keywords: Fire potential, prediction, response, consequence, landscapes.

Research Questions

1. What is the SENSITIVITY of the "system" (potential impacts) to biophysical, operational, response drivers and community attributes?
2. What improvements can be made to the CHARACTERIZATION OF KEY INPUTS that constitute these drivers and attributes? What needs improvement?
3. Can we construct a RATING OF FIRE POTENTIAL (e.g. critical thresholds) that progresses from insignificant through to "Extreme" consequences?

Project Themes / Projects

Priority A

1. Improvements to "CHARACTERIZING DYNAMICS AND SCALE OF FIRES" using diverse modelling and empirical approaches. Key components:
    a. Ember density and transport
    b. "Fire Area Footprint" - energy release
    c. Transitions of (non-linear) fire development and corresponding implications for "Response" (for firefighter safety, initial attack, community safety)
    d. Transitions of fire characteristics across fuel type boundaries, including the wildland-urban interface (WUI).

Priority A

2. Modelling of biophysical attributes to inform and predict "CONSEQUENCE" at appropriate spatial and temporal scales to develop a full understanding of fire potential.

Priority B

3. Develop a "FIRE DAMAGE POTENTIAL RATING SYSTEM" (to replace/complement current Fire Danger Rating Systems) that incorporates patterns of fire development and regional characteristics.

Priority C

4. Modelling of "RESPONSE LIKELIHOOD" at a fire event (probability of success) on daily and hourly time scales to support decision making during operations. Used to inform:
    - resources capability and type required and where
    - evacuation likely to be considered or not
    - communication capability likely to be compromised or not

Measures of Success

1. Less false alarms (about catastrophic conditions), better targeted warnings (in time and location), leading to increased confidence in decision making and response by the public.
2. Increased suppression effectiveness - having the right resources in the right location at the right time
3. Reduced relative suppression costs and/or losses due to a more measured response - not too much (waste), not too little (ineffective and waste).
4. Better intelligence for managers, public and responders
5. Enhanced landscape management to reduce risk/losses (social, environmental, economic).
6. Better able to target expenditure based on cost/benefit analysis.

Community

Agency

Strategic / Long-term

Benefits of Collaboration

1. Combination of data-rich empirical data (Aust) with strong physical skills (US)
2. Broader knowledge-, skill-, experience-base to deliver research outcomes quicker.
3. Combined fire environments captured to help develop more universal models / systems (biological, meteorological, terrain).
4. Greater benefit to responders in international exchanges (training, models, systems) based on shared research.
5. More attractive to harness "external" skills and resources
    a. Avoid duplication
    b. Broader acceptance
    c. Critical mass - cost effective
    d. Better critical thinking / brain power
6. Ability to attract additional funding and resources through international collaboration.

Resources Required

Skill Sets

1. Plume - atmospheric physics / convection / meteorologists
2. Embers - combustion and transport (flight)
3. Fuel -
    a. Combustion processes / resident time
    b. Fuel moisture (live, dead, different fuel types)
4. Modelling -
    a. Statistical
    b. Operational
    c. Programming
5. GIS / Remote Sensing
6. Research Program Management
7. Fire Behaviour
8. (collaboration with fire impact modellers)

Physical

1. Computing power (super computer / multi-processor computer)
2. Wind tunnels / fire labs
3. Environmental chamber (fuel conditioning)

4. Infra-red scans, remote sensing data, experimental data
5. Validation sites (field, based on data gaps)

Financial

1. Project 1 - $millions
2. Project 2 - $100'sK in association with Project 1
3. Project 3 - $100'sK
4. Project 4 - $100'sK

Tools

- Wildfire Decision Support System (Boise)
- PHOENIX RapidFire (Aust)
- others

One example of a Fire Damage Potential Rating System

Table 1. A four level ranking of Fire Damage Potential in terms of potential house and human life loss. This would complement the Fire Danger Rating not replace it.

Ranking	Potential Loss
LOCAL (CATEGORY 1)	• A number of individual houses could be lost before a wildfire is controlled in a region. • Potentially life threatening.
SIGNIFICANT (CATEGORY 2)	• Tens of houses in a region could be lost to uncontrolled wildfires. • A number of fatalities possible.
MAJOR (CATEGORY 3)	• Hundreds of houses in a region could be lost to uncontrolled wildfires. • Several fatalities possible.
CATASTROPHIC (CATEGORY 4)	• A thousand houses or more could be lost in a region to uncontrolled wildfires. • Tens of fatalities are possible.

Civilian Protective Actions in Wildfire in Australasia and US

Project leaders

US: Tom Cova, Scott Stephens
Australia: Alan Rhodes

Problem statement:

There are limited range of actions people can take in response to the threat of wildfire, either staying in the threatened area or leaving. If people stay they can either proactively defend the property or they can seek shelter. If people leave the choices involve timing, location to which they go and means of travel. People may also have to seek shelter if they are unable to leave, change their mind or have no alternative location available (e.g. visitors)

No protective action is viable in all circumstances for everyone. The circumstances that influence the effectiveness of these protective actions are highly dynamic and lead to a high degree of complexity.

Understanding the circumstances and their complexity is critical in assessing the effectiveness of protective actions.

Research questions

What are typical patterns of people's response in wildfire across different contexts e.g. different fire events, different countries?

What factors are critical in determining effectiveness of various protective actions?

Preliminary project description

- Joint approach to reviewing, collecting and analysing data across different localities
- Develop agreed categories for describing key variables
- Conduct meta-analysis/synthesis of existing data and literature relating to response, fatalities and survival in wildfire
- Analyse existing data sets and collect new data on response in various contexts

Outputs

- Framework defining efficacy of various protective actions
- Decision making support tool
- Journal publications

Resources

Stage 1: Review existing data sets and develop agreed protocols for further data collection $100K 6-12 months
Stage 2: Collect additional data – different fires and different countries, analysis of data $200K per annum for 3 years
Stage 3: Development of framework to inform policy, advice to communities and decision support tool $250K 12 months
Stage 4: Develop decision support tool $250K 12 months

Benefits

Understanding the critical factors influencing effectiveness of protective actions provides support for development of evidence based policy. Research can also contribute significantly to formulating advice and support to communities. Joint approach allows leveraging information and data to develop a more detailed and informed approach and learning from different contexts.

HOME VULNERABILITY ASSESSMENT TOOL

Delivering a tool that defines the likelihood of home survival and the appropriate mitigation measures and their relative effectiveness

Project Presenters:

Australia/NZ: Rob Rogers (NSWRFS)
USA: Ethan Foote (Cal Fire)
Other participants and organisations (subject to confirmation):
Organizations
Department of Homeland Security
Bushfire CRC
CSIRO
AFAC
US Land Mgt and fire agencies
Aust/NZ Land Mgt and fire agencies

FEMA Hazard Mitigation
ASTM
ICC
USFS Intermountain Fire Sciences Lab
NIST
NFPA Research Foundation
Individuals:
J. Leonard (CSIRO)
D. Sapsis (Cal Fire)
M. Chladil (TFS)
Michele Steinberg
Ethan Foote (Cal Fire)
Rob Rogers (NSWRFS)
M. Steinberg (NFPA)
G. Buckley (NSWFB)
J. Cohen (USFS)

Problem Statement:

What is the problem which is being addressed by this proposal?

Interface fires occur in many parts of the world. In North America and Australia there have been disastrous losses of life and houses. These losses have driven mitigation efforts but the effectiveness of these efforts is not well quantified.

The project initiative first qualifies and integrates the current tools and understanding of interface vulnerability and then provides the means for delivering a mature solution that is relevant on the international stage.

Considerable progress in developing tools for improving the fire safety of new developments has already occurred. However for the case of existing development there are many challenges in being able to retro-fit fire safety measures. There is a need to develop measures that can be delivered to communities who are currently under threat.

If houses do not ignite during wildfires then they do not burn. If houses do not burn then the wildland fire home destruction problem does not exist. This suggests there is potential to solve the interface problem by reducing the potential for building ignition.

Before describing house ignition potential, and thus, assessing house vulnerability, we must first define the problem in terms of house ignition.

To paraphrase C.P. Butler (1974): At its simplest, the wildland urban interface fire occurs when the fire spreads from the wildland fuel (vegetation) to the urban fuel (houses and other structures). For this to occur the fire must produce flame, radiation and fire brands sufficient to ignite the flammable parts of a house. Given extreme wildland fire behaviour, or lesser conditions, the home ignition potential or home fire vulnerability, is principally determined by the home materials and design, in relation to the exposure which is determined by siting and surrounding fuels.

Although there is significant background knowledge about the variation in the vulnerability of different house and urban form combinations, there remains a significant task to quantify the extent of the variation and the relative influence of different factors.

Residents need to be able to quantify their own vulnerability and the likely impact of different mitigation measures, as well as to assist them in decision making during incidents.

Fire fighters and agencies need a tool as a field guide for pre-fire advice and inspections and for pre-incident planning. During operations this tool would be the basis of triage and thus improve situational awareness among fire fighters and inform tactical and strategic decisions. Also, it would assist in Rapid Impact Assessment which is essential for early commencement of recovery efforts. The tool would also be the basis for post fire assessments.

Research Questions:

What are the research questions or hypotheses to be tested to solve the problem above

Stage 1

How can building vulnerability be quantified/rated effectively? **2 person years**

How do you define total cost of interface fire disasters (past and present, also cost to whom)? **1 person year**

How to express probability of catastrophic home loss? At what scale is this info important?1 person year

Stage 2

Methods are needed for defining/quantifying the potential effectiveness of identified mitigation treatments for:

- Property retrofits (passive and active)
- Landscape modification
- Stay/go behaviour
- Homeowner defensive action approaches
- Ongoing maintenance and monitoring requirements
- Etc

15 person years

Stage 3

How can Fire Fighter's be effectively trained and resourced to quickly and effectively assess defensibility of structures in real time? **2 person years**

How can you integrate mitigation methods with other values such as amenity 2 **person years**

Best practice to 'institutionalise' local practice/knowledge? (overlap with community safety group)

How can FD's effectively predict the need for proportional response? **1 person year**

What are key, replicable elements of a post-fire disaster assessment protocol? **1.5 person years**

What process is sufficient to validate the defined test methods? (ignition resistant materials) stage 1 lit review and priority setting = 1 person year. Stage 2 detailed investigations 8 person years. Stage 3 test and validate = 3 person years. Stage formal protocol 1 person year.

Deferred Work

Fire in the Broader Policy and Planning Environment – parked, but considered important, and noted:

There is a proposal to work in this area in the Bushfire CRC extension and there is considerable scope to make this a collaborative and comparative study.

It is noted that these projects, and others, should be clear about who needs to have the knowledge produced, and thus design projects to produce outputs that are comprehendible and useful to a range of stakeholders in the "development community" eg. planners, designers, developers, etc.

All research products will enter a complex policy environment rich with other imperatives and values. Hence there is a need to:

(i) Factor in the implementation environment (multiple policy sectors) at the research design phase rather than post-hoc, to ensure relevance, acceptance and use. This does not mean doing policy research, but being informed by it.

(ii) Improve the fire sector's knowledge of other factors influencing the structure, planning and use of the interface – housing affordability, energy efficiency, water sensitive urban design, aesthetics, etc – to identify tensions and synergies and so to inform communication, implementation and uptake.

Benefits of Collaboration:

Why is this project best complete by a joint investment of Aus/USA

The fundamental physics and mechanisms of interface wildfire exposure and building ignition are the same on both continents. Individually, the research, advisory and regulatory communities in each country have found it difficult to reduce the magnitude of interface losses.

Something more needs to be done.

Following on from the success of the existing bilateral firefighting support agreement, the Wildfire Urban Interface (WUI) research communities working together will achieve three key things that are not possible in isolation:

1. The development of a common approach to a common problem. Consistent language and methodology allow for a more fruitful exchange of research results and eliminates unnecessary duplication. This consistency increases the government and community confidence in results.
2. It capitalises on a range of diverse expertise and infrastructure to exploit economies of both scale and scope in an area where definitive experimental work is very expensive. This includes:
    - NIST – wind tunnel test rig suitable for ignition testing and access to Japanese test facility through their pre-existing research agreement
    - IBHS – larger scale wind tunnel for extreme wind load testing of structures
    - CRC Dataset – extensive data collected on 2,000 homes after the 2009 Black Saturday fires
    - Mogo – full-scale flame zone integrated structure testing

    These are examples of unique tools available for researchers that are difficult to reproduce and better shared.
3. It breaks down barriers to acceptance by decision makers at all levels, from regulators to home owners, of the emerging research outcomes that call into question some firmly held but unfounded conventional wisdom. The critical mass achieved through collaboration is greater than the sum of the individual parts in communicating new messages that lead to better outcomes.

Just as sharing firefighting resources is feasible by virtue of alternating summers, the pooling of research resources for data collection and field truthing of tools that are developed is also an important benefit of collaboration. The US Intergovernmental Personnel Act provides a funding mechanism to exchange fire research personnel.

Resourcing:

An indicative level of resourcing; people, and other expenses

- **Title**
  - **Situational Awareness in the WUI**
- **Project Leads**
  - **Bob Roper (US)**
  - **Andrew Short (AUS)**
- **Problem Statement**
  - **Before quality decisions can be made, a person must have situational awareness to facilitate decisions and corresponding actions**

- Fire in the Interface
- Joint US – AUS Research Symposium: Melbourne and Canberra, 14 – 18 June 2010

Situational Awareness in the WUI

- **Research Questions**
  - **What information is needed**
  - **How best to provide that information**
  - **How to provide real-time information**
  - **What information models and processes are necessary to generate positive outcomes**
  - **What human decision-making factors are relevant**
  - **Validity of auto decision making vs. human decision making**

Situational Awareness in the WUI

- **Benefits of Collaboration**
  - **Similar cultural values, emergency management operational practices and environments**
  - **Economic efficiencies**
  - **Reduction of previous life and property loss**
  - **Supports current bilateral agreement**

Situational Awareness in the WUI

- **Outcomes, schedule, resources**
  - **Project will answer research questions, thus opening private market to develop commercially viable tools**
  - **Multidisciplinary team involving roles from R&D community and diverse user community**
  - **Two-year term**
    - **Year 1: Develop and evaluate information models for improved WUI situational awareness**
    - **Year 2: Develop and evaluate process alternatives for situational awareness information delivery**
  - **About 3-5 FTE each year**

Fire in the Interface
Joint US – AUS Research Symposium: Melbourne and Canberra, 14 – 18 June 2010