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## ***Critical Assessment of Information on Bushfire Preparedness for Residents***

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### **0 Abstract**

The risk management of hazards such as bushfires utilizes various means for enhancing disaster preparedness, such as printed materials (leaflets, brochures, books), picture series (graphs, slides, posters) and videos. If active participation of residents is to be achieved, motivating risk information/communication/education campaigns are vital. However, mere distribution of information is not enough - it is crucial that communication efforts are effective. This requires socio-psychological expertise and critical impact evaluation. In a project on bushfire preparedness programs, materials used by fire authorities in bushfire information/education were studied. The research questions included: What are relevant criteria for risk communication? Which factors determine whether residents evaluate information material as useful? How do officers and experts assess the utility of educational materials? What is the didactic value of texts and audiovisual materials?

Data were collected via surveys with residents, focus-group discussions, and expert appraisals of materials. Results indicate: Short one-issue leaflets and broad/comprehensive booklets are useful in different contexts; the use of (color) illustrations is expected, yet they seem more significant for attracting attention than enhancing understanding; graphs and drawings are less appealing but more instructive; 'fill-in-yourself' sections (e.g., checklists, agendas) are appreciated but not much utilized. Regarding videos, realistic footage and practical advice for bushfire preparedness are especially esteemed features; accompanying booklets (summing up key points) would enhance their utility.

Future investigations should look carefully at the best use of specific means such as drawings or simulations. Furthermore it seems necessary to test newer information technologies, such as CD-ROM's, and explore the feasibility and efficiency of improving disaster preparedness via InterNet use.

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## 1 The problem: evaluating communication effectiveness

Every country, wherever in the world, is vulnerable to disasters. Once humans face the risk of environmental disasters - natural ones such as floods, hurricanes, wildfires or earthquakes; or technological ones, such as explosions, chemical spills, train crashes and so on - hazard management becomes a very important task (Blaikie et al. 1994, Drabek 1990, Raphael 1986). In Australia, fire hazards are particularly salient (EMA 1997). Bushfires are seen as a genuine part of the Australian ecology (Pyne 1991). In spite of major advances in bushfire control, bushfire disasters have claimed hundreds of lives and assets worth billions of dollars - thus the risk of disasters remains very real.

People exposed to hazards need to be optimally informed about risk characteristics, preventative measures, appropriate behaviors during emergencies, and they must understand their own responsibility. Authorities have to compose pertinent planning, prepare coping strategies and effectively communicate the relevant information to residents and communities as a whole (Barham 1986, Canter 1985, Salter 1991). The more disaster management requires active involvement of residents, the more vital risk information/communication/ education become (Covello et al. 1988, Fischhoff et al. 1997, Soerensen & Mileti 1991). However, mere distribution of material is not enough - it is crucial that communication efforts are effective. This requires socio-psychological expertise and critical effectiveness evaluation. Within pertinent campaigns, various means are used for enhancing disaster preparedness, including leaflets/brochures, picture series (graphs, slides, posters) and videos; altogether printed material is prevailing.

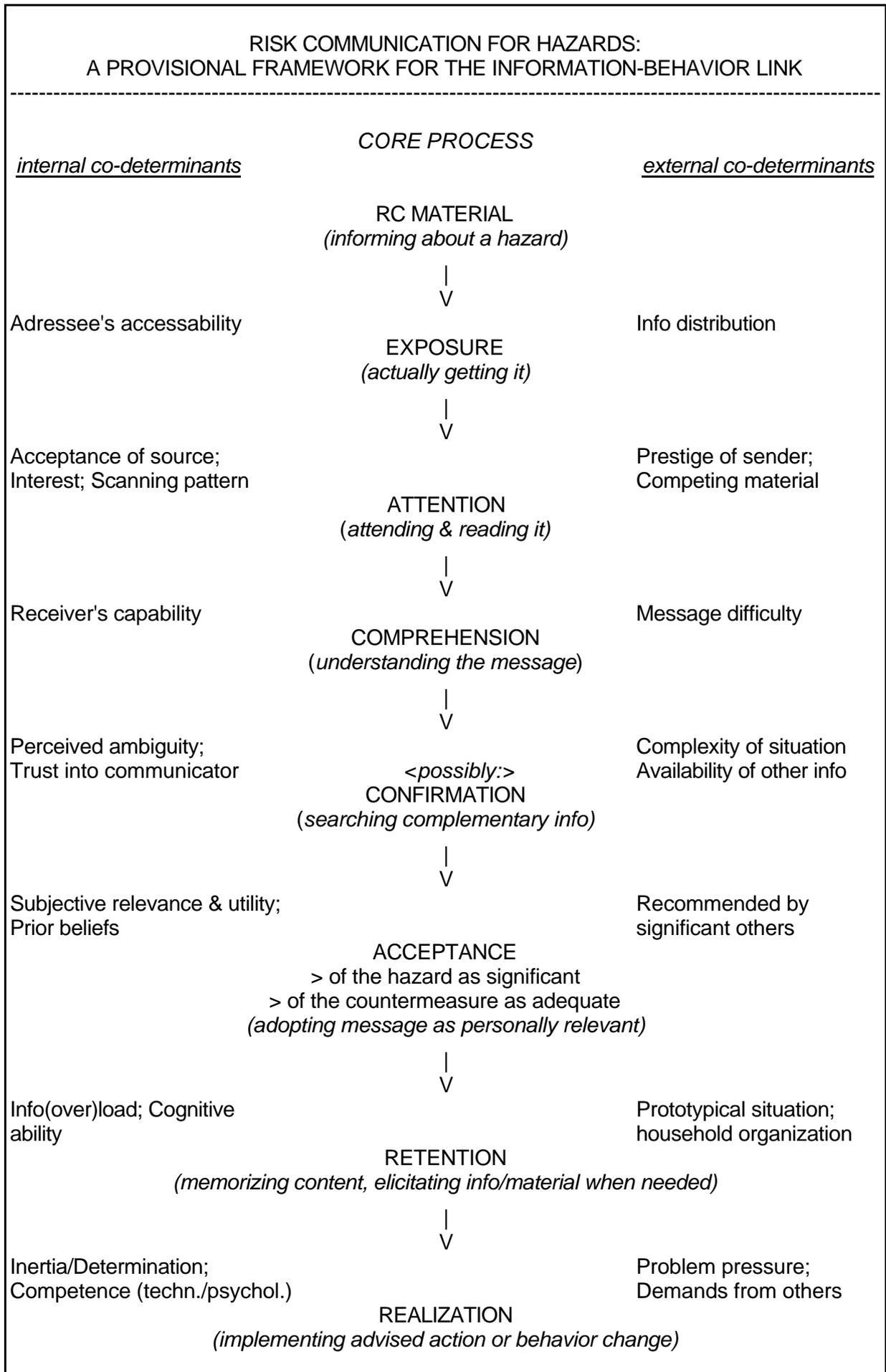
How efficient is the use of such materials? Is the disaster preparedness of people at risk improved? Do the employed risk communication (RC) strategies 'work' with respect to the target group, and what are the preconditions of effective programs? To answer such questions, *empirical* evaluation is indispensable (Gaul 1997, Kasperson & Palmund 1989, Rohrmann 1992) - yet pertinent empirical studies are still rare (Lange 1998, Rohrmann 1998). *Valid evaluation research* (i.e., the scientific assessment of the content, process and outcomes of an intervention (here: RC program) and their assessment according to the stated goals (Fink 1993, Patton 1997; see Rohrmann 1992 with respect to RC) needs to be based on two conceptual steps: assessment criteria are to be explicated, and this requires a realistic model of the RC process under study.

Such a model was presented in Rohrmann 1995 and 1998. It states that the impact of risk information on the ultimate outcome variable, risk-reducing behavior regarding a hazard (here: bushfires), is determined not just by the communicated content of the program but the result of a complex evaluation process. This includes (re-)appraisals of the risk situation as well as the suggested action, and is influenced by personal characteristics (exposure, skills, risk beliefs etc) and manifold context factors, e.g., attributes of the information source and 'channel' features as well as family/friends and the community one belongs to. Also, a longitudinal perspective is implied, as any risk communication has to deal with pre-existing attitudes and behaviors and is shaped by the safety culture prevailing in a society.

Such a conceptual framework can also be utilized to identify barriers to a successful risk communication process. In *Box 1*, the implications for the information-behavior link are shown in a related model. For each step of the core process (from receiving information to implementing an advised action or behavior change) both internal factors and external influences must be favorable to achieve the RC goal.

These models guided the specification of evaluative criteria and the design of instruments for empirical investigations on hazard information and disaster preparedness programs. The main aspects are listed in *Box 2*.

*Box 1:*



Box 2:

## ASSESSING RISK COMMUNICATION EFFECTIVENESS

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### Type of criteria and examples

#### *Content evaluation*

e.g., correctness & completeness of information, comprehensibility, usefulness of graphs/pictures/drawings, concordance with information needs, feasibility of proposed activities

#### *Process evaluation*

e.g., difficulties/failures in running the program, inclusion of relevant actors/societal groups, feedback and confirmation possibilities, relevant target audiences reached

#### *Outcome evaluation*

e.g., reception of materials, increased problem awareness & knowledge, acceptance of messages, change of beliefs, utilization of proposed activities, risk-reducing behavior

#### *Practicality aspects*

e.g., ease of storage of the materials, availability of info updates, technical requirements

### Pertinent assessors (depending on the evaluation criterion)

A: RC *agency* (authoring the risk communication material or program)

E: hazard and/or risk communication *experts* (independent researchers)

R: information *receivers* or participants of the RC program

*Source: adapted from Rohrmann 1992 & 1998*

The overall criterion "effectiveness" is to be explicated by observable characteristics of program materials and strategies. The first set of criteria refers to the question whether the *content* of the message and its presentation is valid for the communication goals; the second set of criteria is related to the *process* of conducting risk communication programs; the third set deals with the actual *outcomes* of campaigns. In addition to substantial (goal-related) criteria, organizational issues deserve attention. For most criteria, data need to be obtained from several sources, in particular the authors and the receivers of RC. As both of these parties might be biased, appraisal by independent experts would be very valuable.

## 2 A research project on disaster preparedness

Given the scarcity of empirical data, it seemed highly relevant to investigate current programs conducted in communities at risk. The project "*Improving bushfire preparedness through effective risk communication*" {IBP} focuses on information/education programs for residents, in particular the materials used by pertinent authorities. The research aim is to clarify the following issues:

- Which factors determine whether residents evaluate information material as useful?
- How do officers and experts assess the utility of educational materials?
- What is the role of texts and audiovisual materials in relation to group activities such as community "fireguard" groups?

The findings are then to be utilized for enhanced community campaigns.

Within the *Project IBP*, the impact of different means of bushfire information/education were investigated in several sub-studies, namely surveys, scaling tasks and qualitative studies using a focus group approach (cf. Krueger 1997, Morgan 1997). These include:

### **Study <1>: Surveys with residents in exposed areas**

**PURPOSE:**

Collecting quantitative data about residents' knowledge/attitudes/evaluations.

**DESIGN:**

Residents surveyed three times, *before & twice after* a specific risk communication event

**MATERIALS:**

Two leaflets (one including pictures) and a 30-page brochure; cf materials A, B, C in list below.

**PROCEDURE:**

Participants received *one* material between interview (1) and (2) and *all* materials before interview (3). Interviews based on standardized questionnaires; data collection (1) via face-to-face interviews, (2) and (3) via telephone.

**SAMPLE/PARTICIPANTS:**

Residents in a bushfire-prone area, N=120; 113, 57 in phases (1), (2), (3).

**NOTE:**

*Phase (1) and (2) conducted in co-operation with B. Lange (Postgraduate Diploma project).*

**Study <2> Focus group discussion on information materials****PURPOSE:**

To enrich the outcomes of the 'quantitative' surveys on a variety of bushfire information means.

**DESIGN:**

Group discussion with residents from bushfire areas; also participation of bushfire experts.

**PROCEDURE:**

The discussions were directed by a standardized guideline and tape-recorded. Duration: 3 hours.

**PARTICIPANTS:**

Groups of interviewees from study <1> (N=8), i.e., residents who had received materials; 3 experts.

**Study <3> Assessment of brochures****PURPOSE:**

To apply relevant RC evaluation criteria to different types of fire preparedness information brochures.

**DESIGN/PROCEDURE:**

Experts assessed bushfire brochures, based on an standardized appraisal form.

**MATERIALS:**

Four brochures, i.e., materials A, C, D, E in list below.

**PARTICIPANTS:**

A small group of scientists (3 each of psychologists, other academics, risk researchers, fire experts).

**Study <4> Usefulness of fire information material in community education****PURPOSE:**

To learn about the utility of printed materials about bushfire preparedness (in comparison to other information means, e.g., lecturing, videos).

**DESIGN/PROCEDURE:**

Personal interviews with highly experienced officers from fire authorities. Focus on their utilization and evaluation of brochures in relation to other materials. Use of scales and explorative questions.

**PARTICIPANTS:**

All CFA facilitators who work with Community Fireguard groups around Melbourne.

**Study <5> Focus group discussion on bushfire videos****PURPOSE:**

To show currently used educational videos and discuss their utility in a community context

**MATERIALS:**

Two videos; cf description V1 and V2 below.

**DESIGN:**

Presentation of videos to residents who participate in Community Fireguard groups; both experienced members of established groups and recently formed groups.

**PROCEDURE:**

(1) General discussion; (2) presentation video [V1]; (3) discussion of V1; (4) presentation video [V2]; (5) discussion of V2; (6) sum-up discussion. Duration: about 3 hours.

The discussions were directed by a standardized guideline and tape-recorded.

**PARTICIPANTS:**

Two groups in country Victoria (N=20).

The main print materials looked at in IBP-studies <1> and <3> (two leaflets, three brochures) were the following:

**"A" *Wildfire evacuation - it's your decision***

*Topic:* Evacuation. Describes factors to consider in the decision to evacuate or not and outlines important steps in planning for evacuation and home preparation.

*Length:* 2 pages (on one A4 sheet). *Features* A black and white flyer, containing text only.

**"B" *"Wildfire evacuation - it's your decision"***

*Topic:* Evacuation. Describes factors to consider in the decision to evacuate or not and outlines important steps in planning for evacuation and home preparation.

*Length:* 2 pages (one A4 sheet). *Features* Flyer with black+white text and 3 pictures in color.

*Note:* experimental modification of "A".

**"C" *"Living in the bush - Bushfire survival plan workbook"***

*Topic:* Bushfire preparedness in general. Comprehensive overview of issues such as fire behavior, evacuation planning, identifying risks for home/property, protective activities, fire-safe planting, building design, and defending the home in a bushfire.

*Length:* 30 pages. *Features:* Elaborated booklet in matte color print. Large colored headings; each page illustrated with photographs and/or diagrams. Also contains a grid to sketch the house and property, space to list tasks/plans, checklists, phone contacts, references.

**"D" *Will you survive? A guide to lowering your risks before and during wildfires***

*Topic:* Bushfire preparedness in general. Describes factors to consider in a survival plan, common misconceptions, preparatory actions. Also covers fire-fighting equipment.

*Length:* 8 pages. *Features:* Booklet in glossy color print. Main points are accompanied by large hand-drawn illustrations. Full-page photographs on the front and back cover.

**"E" *"Bushfire: Recognise the risks"***

*Topic:* Bushfire preparedness in general. Describes relevant steps to consider in developing a survival plan. Briefly describes bushfire behavior and disputes common misconceptions

*Length:* 8 pages. *Features:* Booklet in glossy color print with photographs (approximately one per page). Contains a checklist for preparedness tasks.

*NOTE:* All brochures (except "B") provided by CFA, the Victorian Country Fire Authority.

Furthermore, two videos on bushfire preparedness were used within IBP sub-study <5>; these are:

**"V1" *Bushfire Hazard***

*Topic:* Impacts of bushfire; planning for evacuation; practical suggestions for preparing the house and property for bushfire.

*Length:* 15 minutes. *Features:* Residents and a fire officer present information; strong footage of fires; text listing key points.

*Source:* EMA/IDNDR, Canberra 1998.

**"V2" *Living with bushfire***

*Topic:* Impacts of bushfire; planning for evacuation; practical suggestions for preparing the house and property for bushfire.

*Length:* 20 minutes. *Features:* Several residents report their personal experiences; strong footage of fires; some use of computer-simulation graphs.

*Source:* CFA, Melbourne 1998.

These two were chosen after inspection of about a dozen videos because they are recent, cover bushfire preparedness issues in general and are professionally made.

### 3 Findings regarding print materials on bushfires

The *survey with residents* (Study <1>) together with the subsequent *focus groups* (Study <2>) provided a comprehensive insight into the viewpoints of information receivers. The main points raised by the group participants are listed in *Box 3*. In a somewhat contradictory way, both compact and comprehensive information is requested. At least some reference to local circumstances is generally expected. Regarding special features, lists to 'tick' and 'fill-in-yourself' sections are appreciated but appear to be not much utilized. The discussion also showed that the information needs of older and newer residents differ considerably.

*Box 3:*

RESIDENTS' VIEWS ON BUSHFIRE PREPAREDNESS INFORMATION (*Project IBP-2*)

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**Brochures: Content & length**

- Information should be factual, concise, presented in point form or ordered lists and be relevant to the specific target audience
- Should include information on personal safety, evacuation, animal issues, local information relevant to the community, and phone numbers for emergency situations
- Suggestion of a booklet of detachable brochures on different issues) so residents can keep relevant materials as a reference and discard others)
- Preference for rather compact leaflets/brochures

**Presentation/layout/style of brochures**

- Illustrations seen as very important; colored, illustrated brochures preferred
- Pictures seen as essential to attract attention and to add emotional tone
- Diagrams and drawings often more instructive more instructive than photographs
- Lists to 'tick' and 'fill-in-yourself' sections appreciated but not much utilized

**Usefulness of videos studied at home:**

- Pro's: visual presentations very instructive; easier to understand concepts presented orally and visually; can add in-depth/technical to general information; 'real-life' footage has greater impact than photographs.
- Con's: videos (if not very short) may be considered as too time-consuming and hence not much watched; content can't be referred to instantly in the case of emergency.

**Media: Radio/Television/Newspapers:**

- Short information spots on the radio (to remind residents to take action to prepare for the fire season) are appreciated.
- Positive attitude towards TV ads on bushfires (tend to be remembered).
- Residents expect to see bushfire awareness messages in a range of media, particularly newspapers, close to the bushfire season.

**Information from the InterNet/WWW:**

- Residents not yet connected to the internet: can not imagine its potential; little enthusiasm for seeking bushfire information on the WWW.
- If connected: not very familiar with the possibilities; skepticism regarding relevance for residents; accessibility in emergency situations questioned.

Selected quantitative results are listed in *Box 4*. (The left part refers to the study's phase 1 in which respondents were provided with one of the materials only; the right part gives the judgments made after they had seen all three materials. Most differences are statistically

significant.) Clearly the elaborated brochure "C" gets the best evaluations, but the short leaflets are judged positively as well as stand-alone info on a topic. In fact many residents prefer compact focused materials to multi-issue ones. The addition of color pictures enhances the rating of "B" vs "A" only marginally.

*Box 4:*

*RESIDENTS' APPRAISAL OF BUSHFIRE INFO/BROCHURES (Project IBP-1)*

*Materials:* "A": b&w, 2 pp on 1 sheet, text only; "B": same as "A" plus 3 pictures in color  
"C": elaborated booklet, 30 pages, in color print (cf. table 2 for details)

<b>Mean ratings of materials</b>	<i>when judging one material alone</i>				<i>after comparing all three materials</i>			
	A	B	C	Sign.	A	B	C	Sign.
<i>Quality aspect</i>								
> Rated as interesting ( <i>scale: 1..5</i> )	3.9	4.0	4.0	n.s.	2.8	3.9	4.4	**(.47)
> Enjoyable to look at ( <i>scale: 1..5</i> )	3.2	3.2	3.7	(*)	2.1	3.6	4.2	**(.64)
> Easy to understand ( <i>scale: 1..5</i> )	4.8	4.8	4.7	n.s.	4.2	4.5	4.6	**(.11)
> Relevant to own situation ( <i>1..5</i> )	4.2	4.4	4.0	n.s.	3.9	4.1	4.2	n.s.
> Answers questions of concern( <i>1..5</i> )		4.0	4.0	4.2	n.s.	3.7	3.8	4.4
**(.21)								
> Seen as reliable source ( <i>1..5</i> )	4.3	4.3	4.5	n.s.	4.0	4.2	4.7	**(.25)
• Overall appraisal ( <i>scale: 0..10</i> )	--	--	--		5.4	6.9	7.9	*(.38)

*Significance: \*/\*\* for  $p < .05/.01$ ; ANOVA's,  $N = 120$  or  $60$  ( $Eta^2$  in brackets).*

In study <3>, systematic *expert appraisals* were collected on four brochures of different design; cf. *Box 5* for selected results. Again the elaborated high-quality brochure "C" is evaluated most favorably, but several assessors found it too long. Interestingly, drawings (as opposed to photos) were judged quite positively because of their instructive value. (Note that "D", while rated below "E" on most aspects, gets a much better score for the illustrations). Also, the specific usefulness of short leaflets such as "A" is acknowledged by most raters.

*Box 5:*

*EXPERT ASSESSMENT OF BUSHFIRE BROCHURES (Project IBP-3)*

*Materials:* "A" b&w leaflet (no pictures); "C" elaborated 30 pp booklet; "D" compact booklet (8 pp), mostly drawings (color); "E" compact booklet (8 pp), many color photos, checklist

	<i>Mean rating for material:</i>				
<i>Quality aspect</i>	"A"	"C"	"D"	"E"	
> Rated as interesting ( <i>scale: 1..5</i> )		3.3 (4)	4.5 (1)	3.4 (3)	4.3 (2)
> Enjoyable to look at ( <i>scale: 1..5</i> )		1.7 (4)	3.6 (2)	2.6 (3)	3.7 (1)
> Easy to understand ( <i>scale: 1..5</i> )		3.6 (3)	3.7 (1)	3.6 (3)	4.0 (1)
> Usefulness of pictures/illustrations ( <i>scale: 1..5</i> )		--	3.6	3.8	1.9
> Length of brochure ( <i>less..ok..more = 1..5</i> )		3.5 (4)	2.7 (3)	3.0 (1)	3.1 (2)
> Usefulness of checklist(s) ( <i>scale: 1..5</i> )		--	3.7	--	3.5
> Seen as reliable source ( <i>scale: 1..5</i> )		4.1 (3)	4.6 (1)	4.1 (3)	4.2 (2)
• Overall appraisal ( <i>scale: 0..10</i> )		5.4 (4)	7.9 (1)	6.2 (3)	6.7 (2)

*(Rank order given in brackets).*

A series of *interviews with facilitators* of the "Community Fireguard" program in Victoria (Study <4>) was very instructive because of their specific experiences and the fact that they use various communication means (discussions, texts, videos, exercises) in conjunction. As listed in *Box 6*, to them particular text components - such as lists of essential preparedness steps - are most important, but they are somewhat skeptical regarding check-lists, reading tips and drawing-grids. Regarding illustration, on average a 60:40 proportion for text:pictures is suggested. Photographs are seen as vital for attention rather than explanation.

*Box 6:*

IMPORTANT FEATURES OF BROCHURES: VIEWS OF OFFICERS ( <i>Project IBP-4</i> )			
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<i>Importance ratings (1..5 = not..very):</i>			
Illustrations (photos, drawings, graphs)	4.3	Lists of essential activities & steps	4.5
Lists of necessary equipment	4.1	Checklists (to be ticked)	4.0
Space/grid for drawing a ground plan	2.8	List of references & pertinent literature	3.6
Glossary of technical terminology	3.4	Contact addresses + phone numbers	4.3
<i>NOTE: Based on interviews with all facilitators of the CFA Community Fireguard program</i>			

For a more comprehensive report on the quantitative and qualitative results from studies <1> to <4>, cf. Rohrmann (in prep).

#### 4 Findings regarding videos on fire preparedness

The use of videos for bushfire information was explored in studies <2> and <4>; in both cases the utility of educational videos was confirmed. Furthermore, two often-used videos on bushfire preparedness (one from Victoria, one from NSW, see description above) were exposed to *focus group discussions* (Study <5>). The main viewpoints of participants are summarized in *Box 7*.

*Box 7:*

RESIDENTS' VIEWS ON BUSHFIRE PREPAREDNESS VIDEOS ( <i>Project IBP-5</i> )
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<ul style="list-style-type: none"> <li>• Real-life footage of bushfires seen as important to raise awareness of the potential physical and emotional impacts of bushfire and thus prompt action to prepare.</li> <li>• This to be complemented by practical advice on how to prepare for and fight bushfire.</li> <li>• Practical, low-cost suggestions for protecting the home are highly valued.</li> <li>• Information should be presented in a calm and rational manner - to foster a sense of confidence and control (and possibly decrease fear).</li> <li>• Videos should be concise and logically structured, with succinct text headings.</li> <li>• They should be supplemented with point-form handouts summarising the key points.</li> <li>• Information is best conveyed by firefighters (providing factual knowledge, e.g., on bushfire behaviour), and actual residents reporting experiences and demonstrating preparedness activities (rather than by officials or experts).</li> <li>• Should include advice on what <i>not</i> to do in a bushfire, and try to dispel common myths.</li> </ul>

Generally, graphic bushfire footage is valued because it substantiates the harsh reality, including emotional impacts and promotes problem awareness. Even arousing fear is accepted by most and not seen as counter-productive as long as instructive advice follows. Consequently, demonstrations of the hazards needs to be complemented with practical guidance and recommendations so the viewer gets the core message that bushfire is dangerous and frightening but can be survived if appropriate steps are taken.

The views within new and old Community Fireguard groups were similar, but residents with little experience in bushfire preparedness tended to show higher demands and to value confidence-enhancing substance.

Some features get mixed and partly critical evaluations, such as larger text blocks, messages presented by officials or experts, and the use of computer simulations of burning bush and houses.

## **5 Conclusions for future work**

The results show that altogether the investigated materials - both the leaflets/brochures and the videos - received quite favorable evaluations. Their usefulness is dependent on the quality of the wider risk communication process though (cf. box 1). Whether short one-issue leaflets or comprehensive booklets are preferred depends on the utilization context. As the use of (color) illustrations is expected but their educational value somewhat ambiguous, professional drawings deserve serious consideration. A respective experimental study could clarify how to capitalize on this option.

Regarding videos as means to enhance bushfire preparedness, a series of videos would be desirable - beginning with an overview of bushfire issues as an introduction, followed by a set of videos elaborating on specific issues. Furthermore, the provision of accompanying booklets which are systematically linked to the content of the video and sum up the key messages would certainly enhance their utility. Particular features such as the amount of text and the use of computer graphs for demonstrating bushfire effects need to be clarified in more detailed studies.

Finally, while print material is reasonably well researched, future investigations should pay increased attention to newer means such as CD-ROM's and explore the feasibility and efficiency of improving disaster preparedness via InterNet/WWW use (where both text and audio-visual material can be presented). Exploratory questions in studies <2> and <4> indicate that these possibilities are not yet used much but have considerable potential, at least in conjunction with conventional risk communication means. Certainly the percentage of households with PC's and InterNet connections is rapidly increasing in Australia. Given the significance of preparedness in a bushfire-prone country, it seems vital to systematically research this potential.

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