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German Fire Protection Association
Advisory Committee on Technology and Science
Task Group Fire Safety Research

We need to do something about 600 fatalities and 6 billion € losses per year!

A strategy for advancing fire safety research in Germany –
a position paper by the German Fire Protection Association
[English translation of key points]

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Summary and need for action

Every year, fires cause human fatalities, many injuries and great damages. Modern scientific approaches can contribute considerably in reducing these costs. In addition, the German industry could be put in a position to offer products and services of outstanding quality not only in Germany but also internationally. Furthermore, the fire services are facing new challenges in the area of civil protection and terrorist threats to public safety as were experienced in recent incidents. Therefore we propose:

- The creation of an independent science advisory board on fire safety: With members from the scientific community as well as practitioners, they should co-ordinate fire safety research in Germany.
- A basic level of funding for selected fire safety research institutions should be securely covered by the federal budget.
- International scientific exchange and networking as well as international standardisation activities (European and global) need to be sponsored by government funding.
- Our highly qualified young scientists need targeted career and development planning.

The sad situation of German fire safety research can be illustrated by the following thoughts: You could regard the German fire services as an industry with an annual turnover of about 5 billion €. An innovative industry would spend about 3 % of its turnover on research and development – which would amount to 150 million € ! However, the actual expenses are only a small fraction of that.

It is not the primary aim of this paper to increase the level of public funding for fire safety research. The focus is on analysing the system of fire safety research in Germany, and a diverse range of options for improving the situation are considered.

What does fire safety mean in Germany?

Human victims:

- About 600 fatalities from fires per year in Germany, 75 % of these in their homes. Smoke intoxication is the leading cause of death. [DFV 2001]
- About 6 000 seriously injured people and 60 000 less severely injured people from fires per year in Germany.

Economic damage (figures for Germany in the year 2000, according to GDV 2002):

- About 6 000 mio. € total damages
- Of these, 1 500 mio. € were compensations paid by fire insurance companies (plus insurance against business interruption which amounts to 400 mio. €)
- Roughly 100 000 fire insurance cases, of which 200 where “million-damages” (> 0.5 mio. €) with an average cost of 4.3 Mio €
- About 670 000 fire cases within the private furnishings insurance which amounted to 520 mio. € plus170 000 fire cases in the housings insurance with a cost of 625 mio. €.

Fire Brigades (numbers for year 2000 from DFV 2001):

- 1 070 000 men and women in German “voluntary” (part time) fire services
- 27 700 members of professional fire brigades
- 32 700 members of corporate fire brigades, 7 000 of these were full-time
- Expenses for fire brigades amount to ca. 4 000 Mio. € per year
- Turnover of German manufacturers of fire engines and equipment amounts to ca. 400 mio. € per year [estimate based on figures on www.vdma.de]

Expenditure for fire safety of **buildings**:

- A British research project came to the conclusion that between less than 1 % and more than 8 % of total construction costs are spent on fire safety measures. The proportion depends highly on the type of building: it is low

for simple one-family dwellings and increases considerably for buildings with high risk like schools, theatres and shopping centres. [Benefeu 2002]

Expenditure for **civil protection**:

- Technical Support Service (Technisches Hilfswerk): 69 000 part-time and 850 full-time members, total budget in 2000 was 108 Mio € [http://www.thw.de/wirueberuns/jahresbericht/organisation.htm]
- Federal budget for catastrophic emergencies within the area of civil protection: 24 Mio € (plan 2002, BMI 2002).

Public fire safety research funding:

- Fire service related research, sponsored by State governments (IMK): 0.6 Mio. €
- Fire safety of buildings, sponsored by German Institute of Construction Technology (DIBt): 1.5 Mio. € (their total research budget)
- Catastrophic emergencies, Federal Administration Authority (BVA): 1.0 Mio. € (plan 2002, BMI 2002).

Why do we need fire safety research?

The German Fire Protection Association (vfdb) strongly endorses efforts to fundamentally reduce damages and costs from fires and at the same time promoting the German “fire safety industry”. Fire safety research can contribute by developing techniques and practical tools. This will mean:

- Less fire injuries and fatalities
- Decrease in economic damages
- Improved competitive stance and export opportunities for fire safety products “made in Germany” (product quality and technical standards are key factors here)
- Fire safety as a selling point for products, when customers appreciate (i.e. are willing to pay for) higher safety levels of products like they do in the automobile area

- We think it is possible to reduce the number of fire fatalities and injuries as well as the total expenses for fire damages by 20 % within the next 10 years.
- We believe that the European market for fire safety products is of high economic importance and has considerable potential for growth.

The federal structure of organisations and authorities which deal with fire protection in Germany has proven to be a serious obstacle for co-ordinated and effective fire safety research. A central co-ordination in Germany would make sense - in particular with regard to European research funding and harmonisation of regulations.

What are crucial fire safety topics where research can contribute to solutions?

Here are some examples of subjects:

1. The development of detailed and uniform fire statistics for Germany has been discussed for more than 30 years– with very limited success so far. Only with such a tool you can analyse where real problem areas are and what the effect of measures for fire safety are in practice. This is one area where the federal or even municipal organisation of fire safety has proven counter-productive.

2. Methods for evaluating the performance of fire safety products and services need to be developed and continuously improved. Part of this is an enhanced participation in international standardisation in order to make German products marketable world-wide.

3. Current technical problems have to be solved like tunnel fires, incidents involving hazardous materials, or new extinguishing agents and technologies (e.g. water mist).

4. Performance based fire safety engineering concepts are gaining more and more acceptance, especially for complex buildings. They take into account the individual building design and its foreseen use in order to prepare a tailor-made fire safety concept which can in turn lead to savings versus traditional approaches. However, in order to be evaluated properly by authorities, more fundamental knowledge and tools for fire safety engineering must be developed. The savings by performance based design are estimated at 1 to 3 % of the construction costs in countries like Australia and USA which have been using this approach for some time [Benefeu 2002].

5. There is a need for data gathering and evaluation methods for a comprehensive risk management in the fire safety area. The goal is to optimise the system of damage cost and cost for precautionary safety measures.

6. The international co-operation needs to be reinforced. On the one hand, appropriate structures and resources are necessary, on the other hand there can be synergies and savings potentials by international sharing of work.

Further examples for fire service research can be found in [Oberhagemann 1996]. Internationally, this area is judged in a similar way [Richardson 2000].

The status quo – the "market" for fire safety research

Tab. 1 : International comparison of budgets for fire safety and fire service research (source: Prof. Dr. Reinhard Grabski: inquiry 2003 amongst members of the „International FORUM of Fire Research Directors")

Country	Institution	Staff[1]	Budget[2]	Comments
Australia	CSIRO Fire Research	23	2,3	
China	State Key Lab of Fire Science	43	1,6	
Germany	FFB	12	0,81	
Germany	IdF LSA	22	1,1	Without construction funds
Germany	iBMB	14	0,75	Estimate, incl. teaching
Germany	MPA Braunschweig	54	2,0	Materials testing only
Finland	VTT	40	3,5	Fire Research and Testing
Italy	ITC	150	2,5	
Norway	NBL SINTEF	32	3,0	
UK	FRS	90	15,5	
USA	FMRC	170 (50 of these for research)	30 (10 of these for research)	Research and testing
USA	NIST	160 (63 of these for research)	30 (of these for research)	Building and Fire Research Laboratory
USA	Sandia	30 (+10 external)	9,0	Factor of 5 incl. similar subjects
USA	swri	41	3,6	
Sweden	SP Fire Technology	53	5,0	1/3 for R &D
Taiwan	ABRI fire research division	16	1,0	

[1] Number of full time staff without differentiating by qualification or contract status, March 2003
[2] Total budget for research from basic and third party funding in million € (1€ = 1US$ for the year 2002

Tab. 1 presents an overview of resources for fire safety and fire service oriented research of German and international institutions. Disappointingly, German institutes are found in the lower ranks, both regarding their budget and staff numbers. The only exception is the Braunschweig Materials' Testing Institute with 54 employees. If you look at the sum of national resources, Germany is about average with 4.7 million € budget and 102 employees.

There is a need to improve:

- The exchange of information and networking between research organisations.
- The academic education for fire safety and fire safety engineering
- The active communication of research results to target audiences and end users on national and international levels

Literature and further reading

Benefeu (2002): The potential benefits of fire safety engineering in the EU (Benefeu), report to DG Enterprise by Warrington Fire Research Group etc., July 2002, EC contract EDT/01/503480

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GDV (Gesamtverband der deutschen Versicherungswirtschaft, 2002): Jahrbuch 2001 – Die deutsche Versicherungswirtschaft. Berlin, www.gdv.org

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