CEN/TC 127/WG 8
CEN/TC 127/WG 8 - Fire Safety Engineering
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WI Proposal: **Economic assessment of fire protection measures**

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TC 127 / WG 8 FSE – Delft meeting

Objective and introduction

The aim of the proposed WI is to provide means of objective assessment of fire safety design economic implications.

What is the highest level of safety which can be achieved at a given level of costs.

Especially useful when multiple design alternatives are considered – avoid „cutting corners“ by spending funds efficiently.

Combination of fire safety engineering output – extent of fire at given level of fire protection (costs) vs extent of damage and threat caused by the fire.

Project background

Long-time topic of interest for all stakeholders.

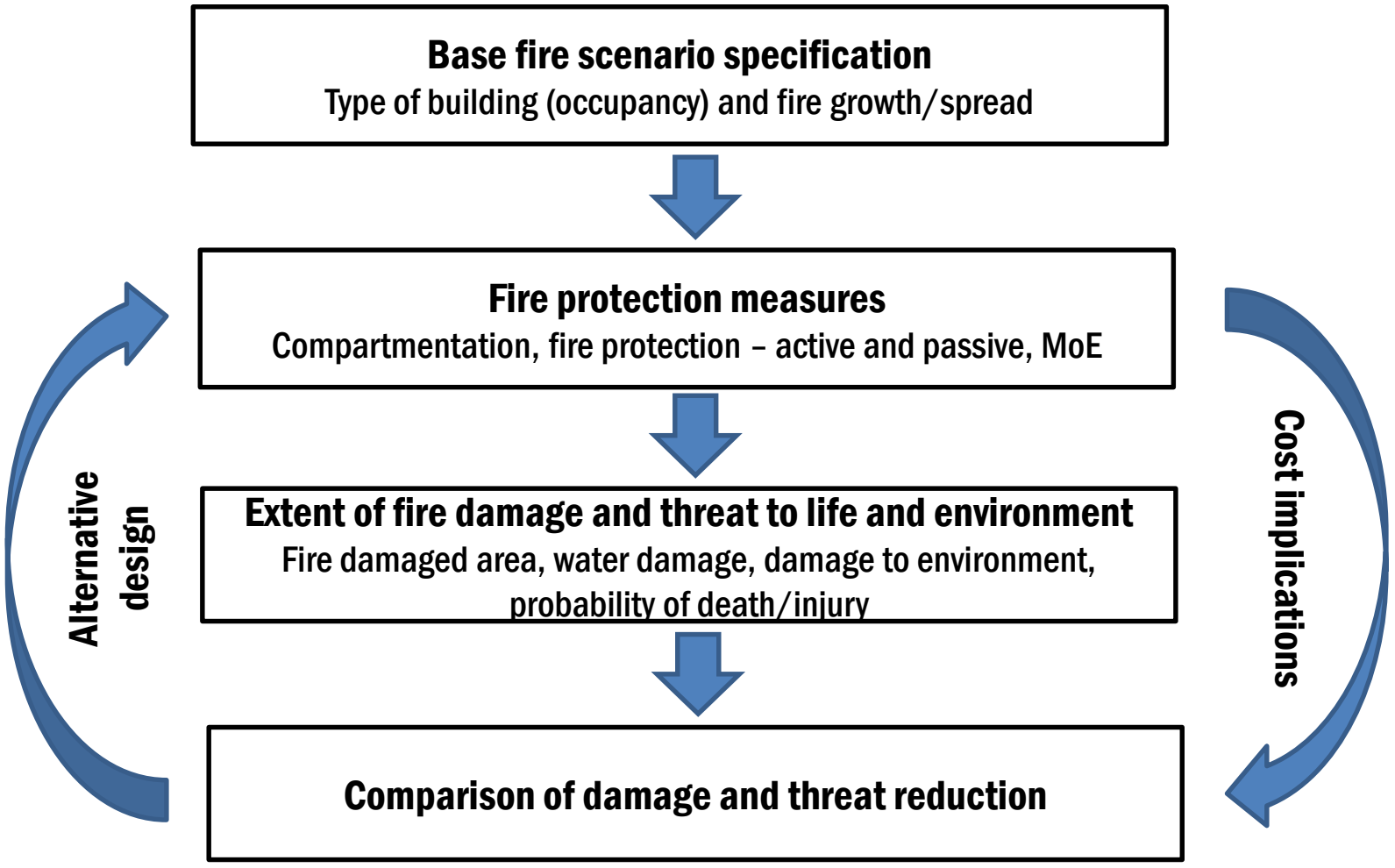
Numerous studies and publications (The value of fire protection in buildings, Economics of fire protection, etc.)

UNIZA currently working on this project under a national grant scheme funding.

Approach – Keep it simple and compatible with existing fire engineering tools.

Addition of a set of economic assessment tools on top of what is already there, i.e. no reinventing of the wheel.

Model framework description



WI Proposal: **Assessment of fire protection measures economic efficiency**

Example of application – property protection

Probability of fire starting (ignition):

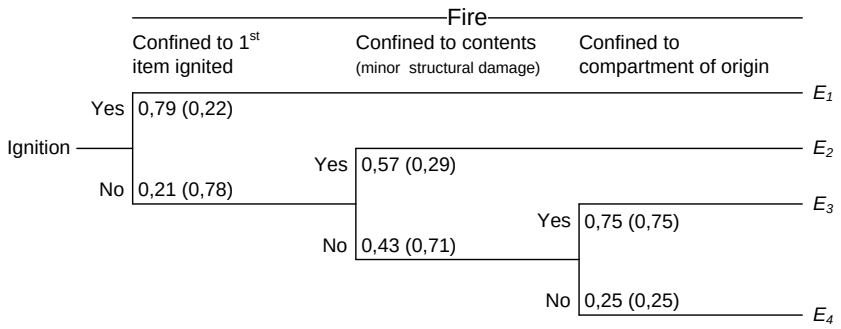
Industrial **– 0,096**

Office **– 0,052**

Shop **– 0,132**

From PD 7974-7

Event tree analysis diagram



values in brackets denote Unsprinklered scenario

Individual outcome probabilities

Fire scenario	Extent of damage	Outcome frequency	
		Sprinklered	Unsprinklered
Confined to 1st item E_1	max. 5m²	0,790	0,220
Confined to contents E_2	50% of compartment	0,120	0,226
Confined to compartment of origin E_3	100% of compartment	0,068	0,415
Spread beyond comparment of origin E_4	2x compartment area	0,023	0,139

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Occupancy	Fire starting		E1		E2		E3		E4	
	P	0	P	0	P	0	P	0	P	0
Sprinklered										
Industrial	$9{,}6.10^{-2}$	10	**$7{,}5.10^{-2}$**	**13**	$1{,}1.10^{-2}$	87	$6{,}5.10^{-3}$	155	$2{,}2.10^{-3}$	464
Office	$5, 5.10^{-2}$	18	**$4{,}4.10^{-2}$**	**23**	$6{,}6.10^{-3}$	151	$3{,}7.10^{-3}$	268	$1{,}2.10^{-3}$	803
Shop	$1{,}3.10^{-1}$	8	**$1{,}0.10^{-1}$**	**10**	$1{,}6.10^{-2}$	63	$8{,}9.10^{-3}$	112	$3{,}0.10^{-3}$	336
Unsprinklered										
Industrial	$9{,}5.10^{-2}$	10	$2{,}1.10^{-2}$	48	$2{,}2.10^{-2}$	46	**$4{,}0.10^{-2}$**	**25**	$1{,}3.10^{-2}$	76
Office	$5{,}5.10^{-2}$	18	$1{,}2.10^{-2}$	82	$1{,}2.10^{-2}$	80	**$2{,}3.10^{-2}$**	**44**	$7{,}6.10^{-3}$	131
Shop	$1{,}3.10^{-1}$	8	$2{,}9.10^{-2}$	34	$3{,}0.10^{-2}$	33	**$5{,}5.10^{-2}$**	**18**	$1{,}8.10^{-2}$	55

Buildings in Europe and America have an expected lifespan of 50-70 years.

Extent of damage

Fire scenario	Extent of damage
Confined to 1st item E_1	max. 5m^2
Confined to contents E_2	50% of compartment (500m^2)
Confined to compartment of origin E_3	100% of compartment (1000m^2)
Spread beyond comparment of origin E_4	2x compartment area (2000m^2)

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Example of application – property protection

Likely total and yearly loss for most probable fire outcomes

Occupancy	Value density*	Likely damage	Likely loss	Occurence interval	Loss per year
	[EUR/m^2]	[m^2]	[EUR]	[y]	[EUR/y]
Sprinklered					
Industrial	300	5	1500	13	115
Office	100	5	500	23	22
Shop	200	5	1000	10	100
Unsprinklered					
Industrial	300	1000	300000	25	12000
Office	100	1000	100000	44	2272
Shop	200	1000	200000	18	11100

*Fabricated values – for demonstration only

Assessed against costs
of fire protection per year
*Sprinkler system 2000 Eur/year

Thank you for your attention!

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