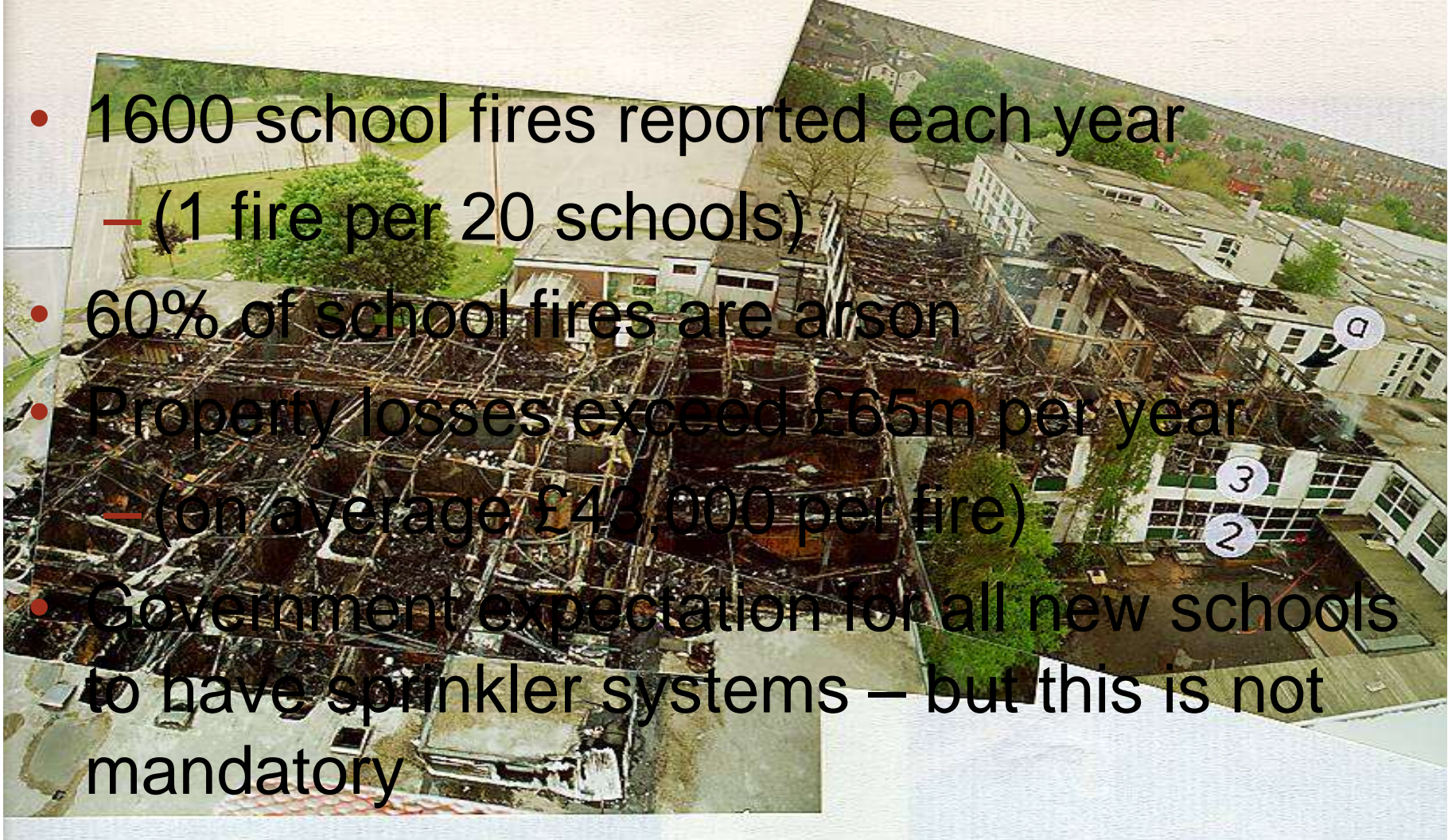


Risk Assessment and Cost-Benefit of Sprinklers in Schools

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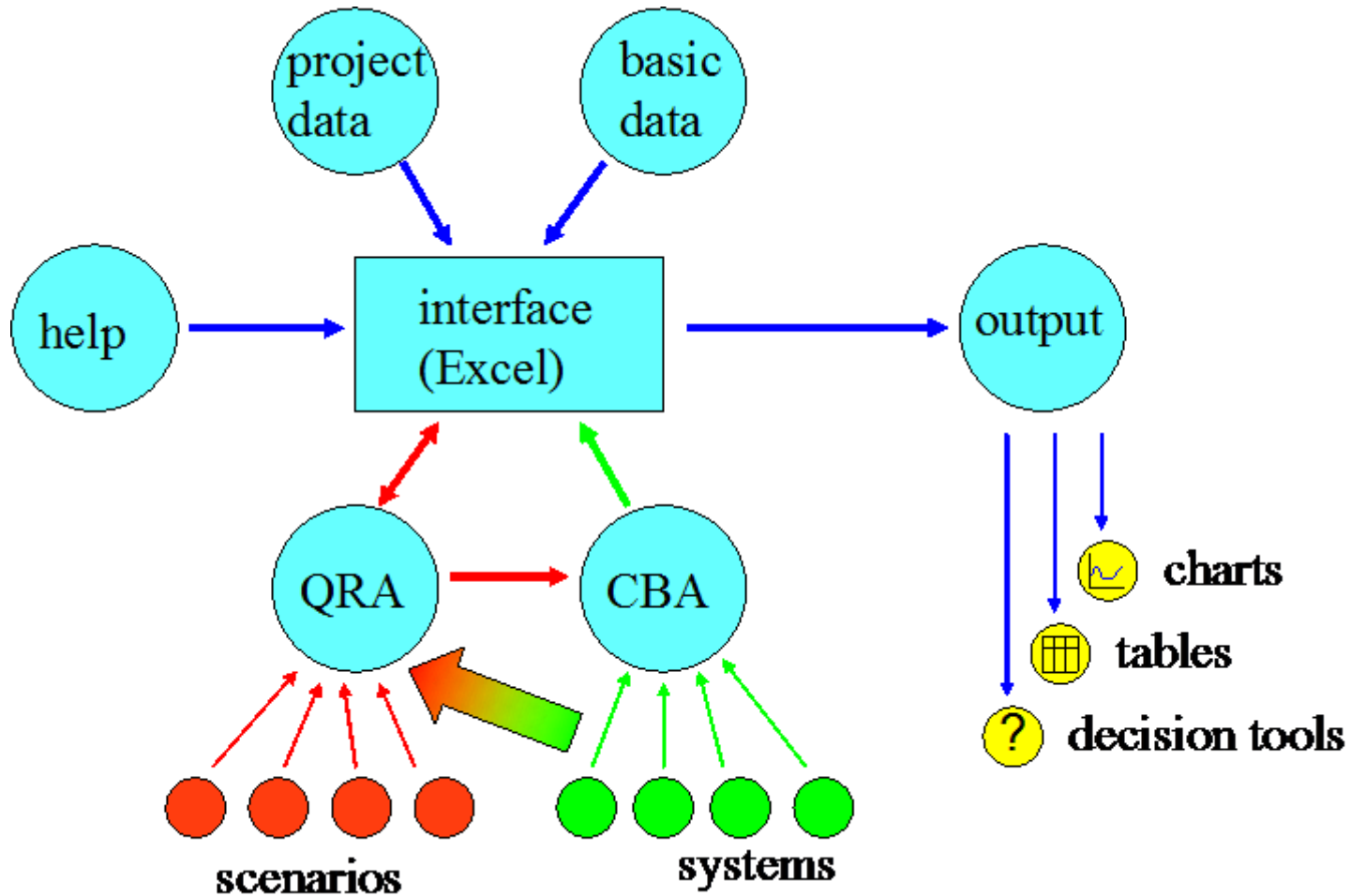
Introduction

- 1600 school fires reported each year
 - (1 fire per 20 schools)
 - 60% of school fires are arson
 - Property losses exceed £65m per year
 - (on average £43,000 per fire)
 - Government expectation for all new schools to have sprinkler systems – but this is not mandatory
- 

Risk and CBA tools in BB100



Cost-Benefit Analysis tool



Fire Scenarios

Location

- classroom
- cloakroom
- corridor
- main hall
- office
- special risk
- store room

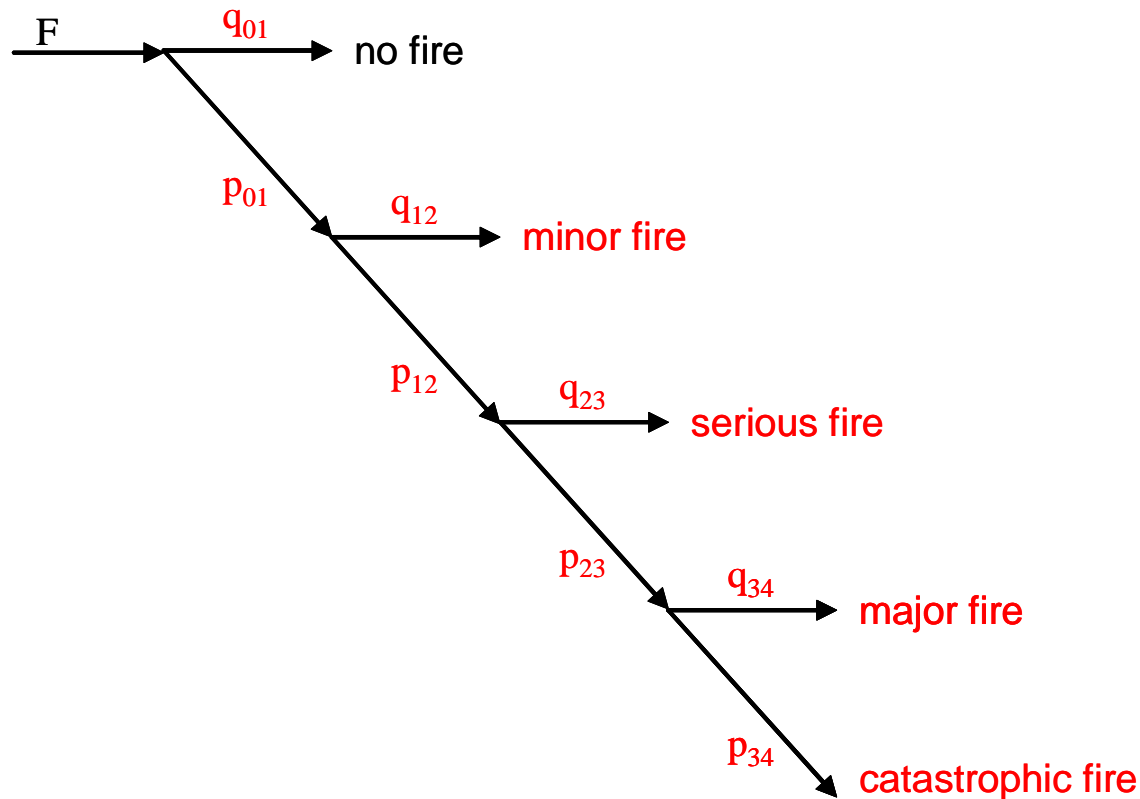
Severity

- **Minor**
 - fire confined to item first ignited; smoke confined to room of origin
- **Serious**
 - fire contained within room of origin; smoke spread beyond
- **Major**
 - fire spread beyond room of origin
- **Catastrophic**
 - fire spread to most of building

Event consequences

- Death / injury
 - Damage to building structure / contents
 - Closure of school / room
 - Environmental pollution
 - ... others?
-
- Handle different consequences by converting to monetary terms

Event trees (“normal” fire growth)



Key

F = ignition frequency (unit = year⁻¹)

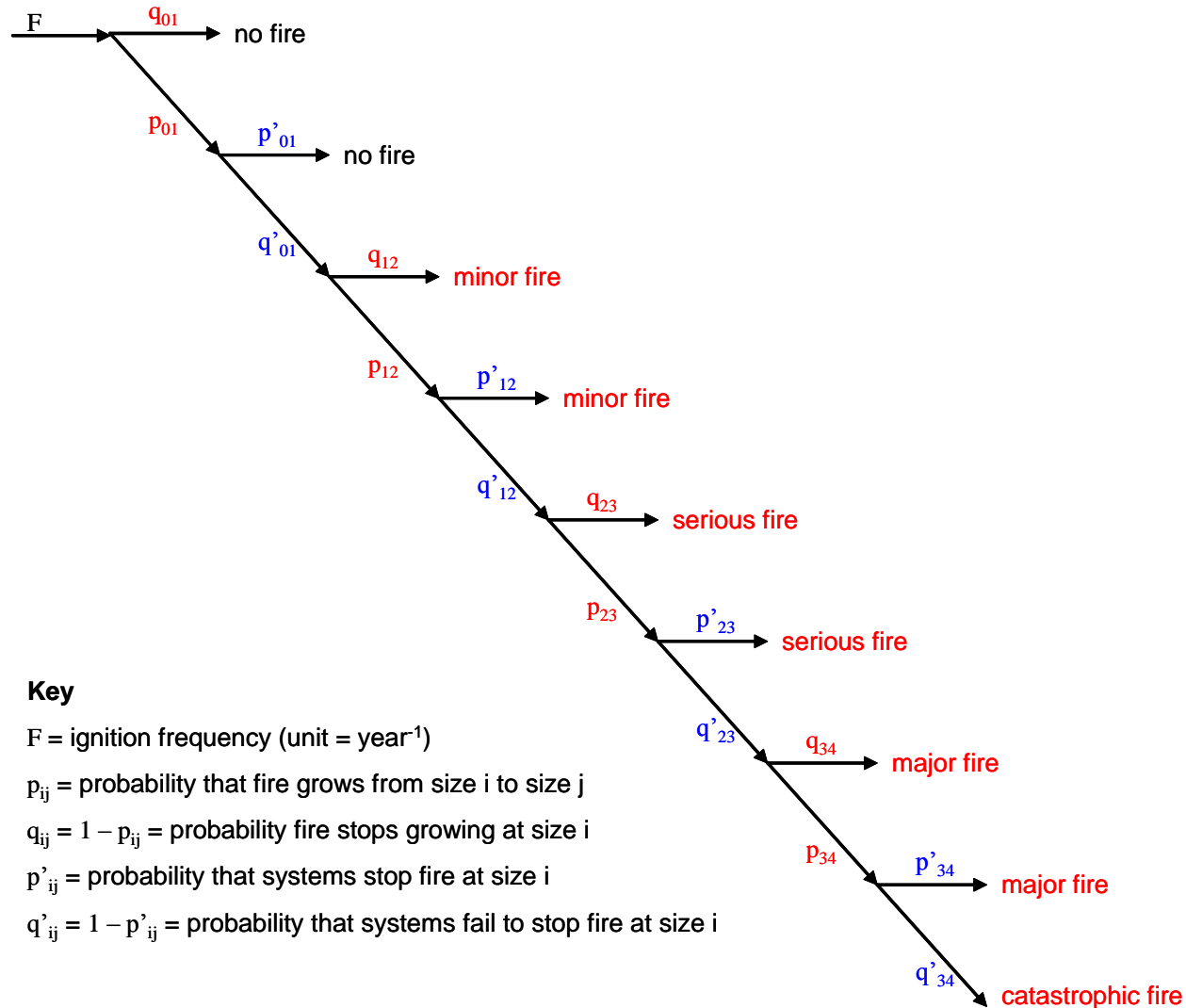
p_{ij} = probability that fire grows from size i to size j

$q_{ij} = 1 - p_{ij}$ = probability fire stops growing at size i

Prevention / mitigation systems

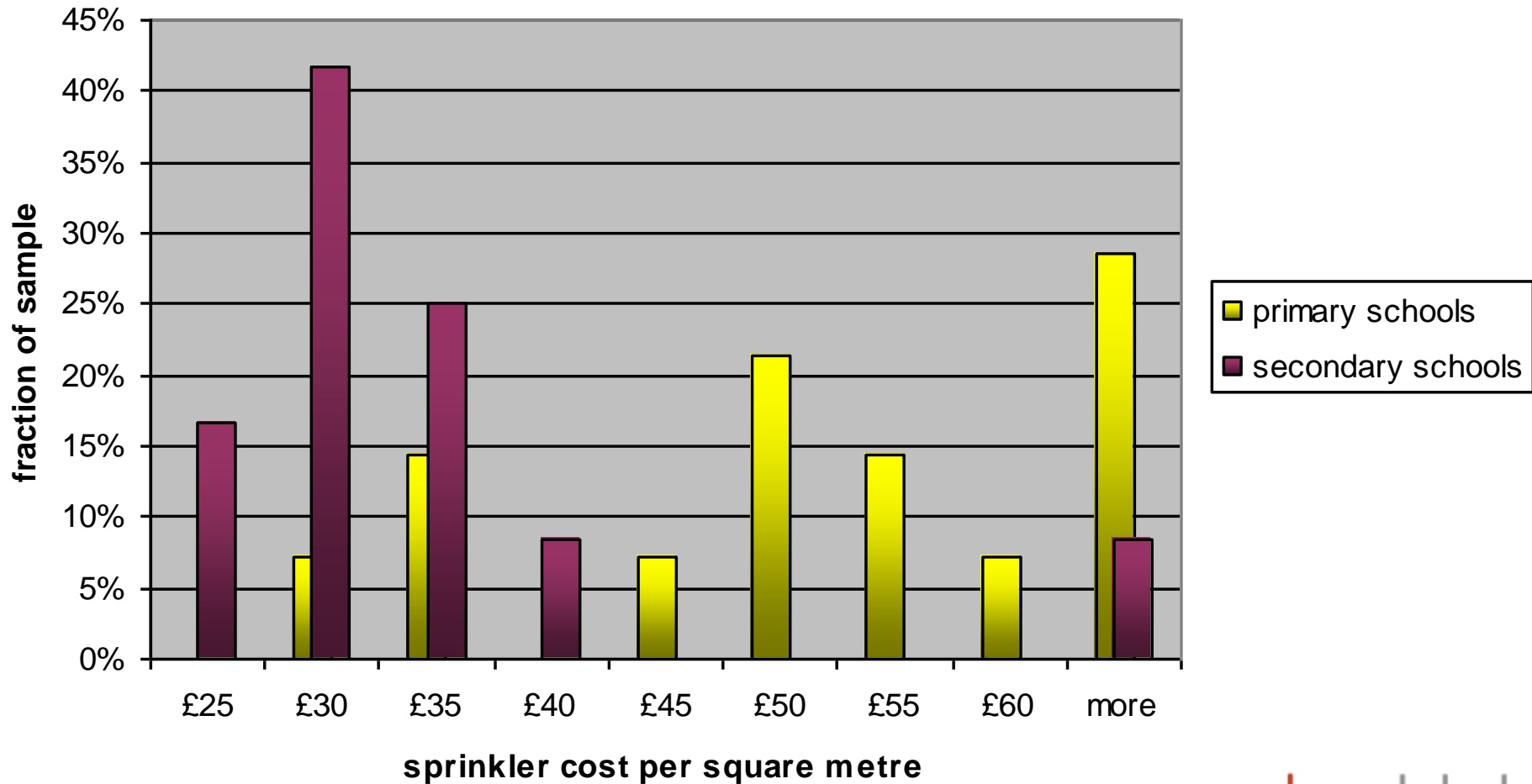
- Given that a scenario's precursor event has occurred, prevent the scenario from occurring
- Given that the scenario has not been prevented, reduce the consequences of the scenario (life safety, property damage, etc)

Event trees (with interventions)



Sprinkler installation costs

Distribution of sprinkler costs in primary and secondary schools

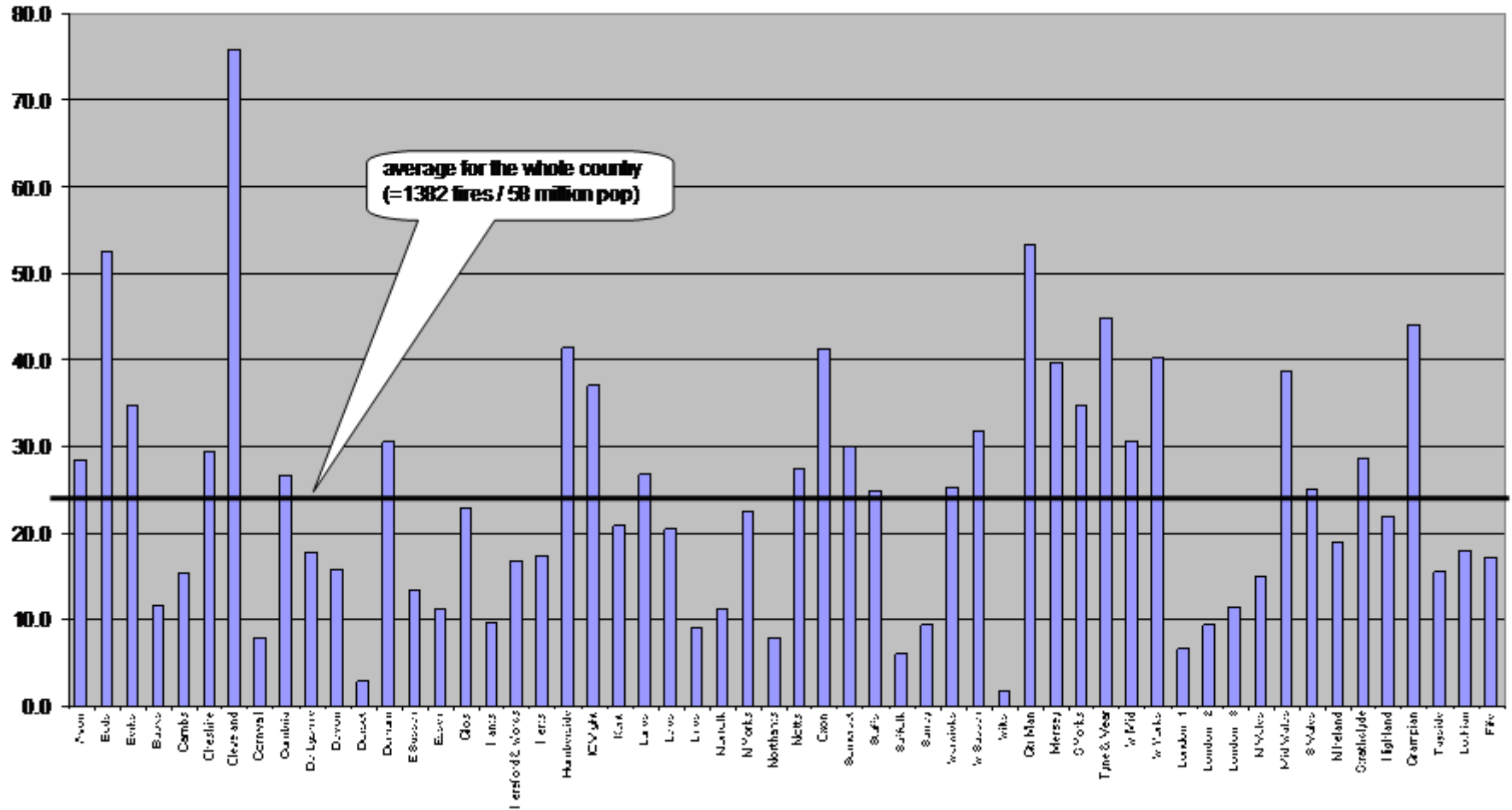


Risk and CBA tools in BB100



Input data: regional variations

school fires per million population (2002)



Conclusions

- CBA tool – freely available from <http://www.teachernet.gov.uk/docbank/index.cfm?id=12202>
- In “average” secondary school, costs and benefits of sprinklers are nearly equal
- Sensitive to:
 - Risk level relative to “average”
 - Details of the insurance policy
- Large uncertainties