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The impact on safety of lost gas welding knowledge

Andy Webb

European Industrial Gases Association

[Originally presented by Patrick Couderc, Air Liquide]

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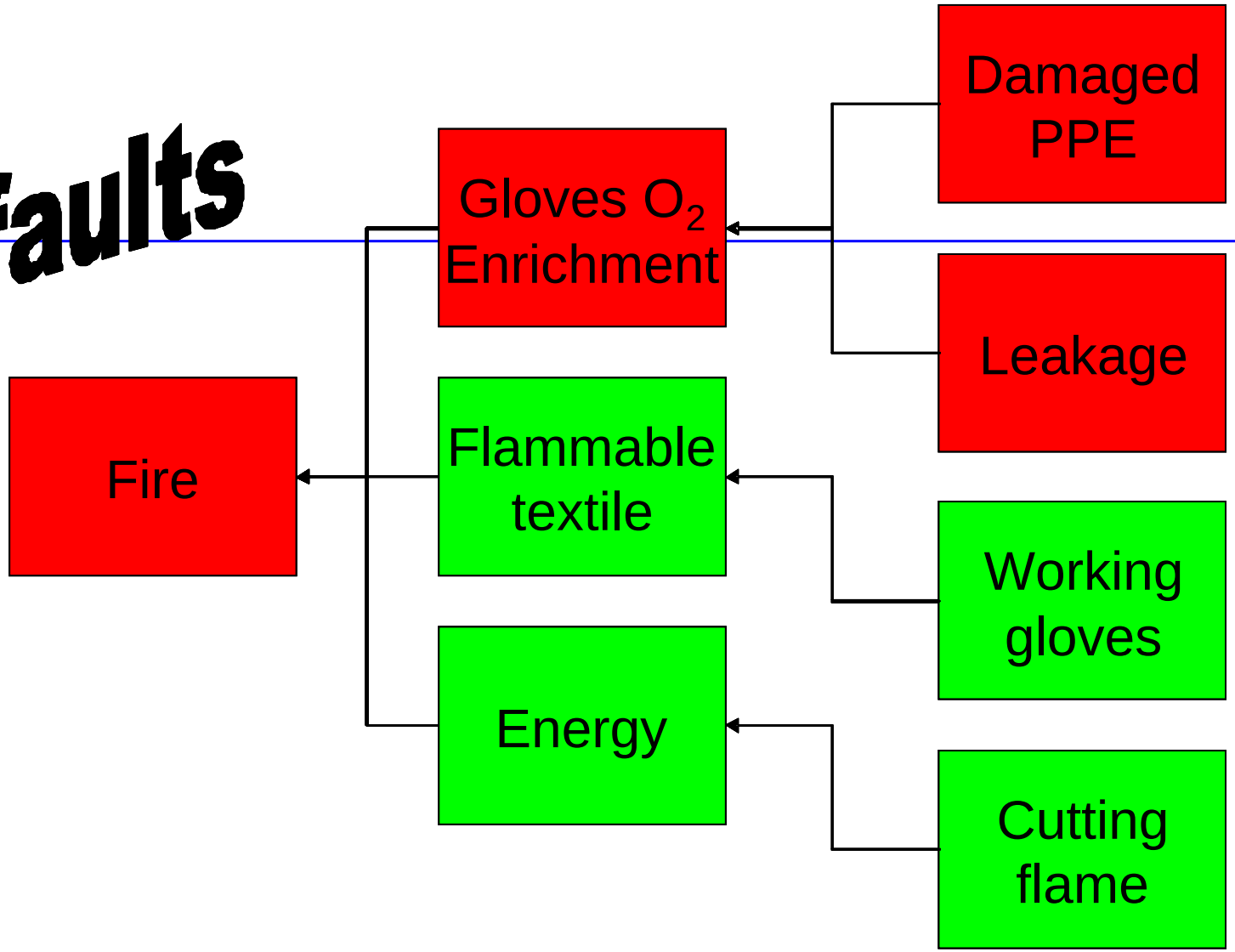

Root cause: human behaviour

Damaged Personal Protective Equipment

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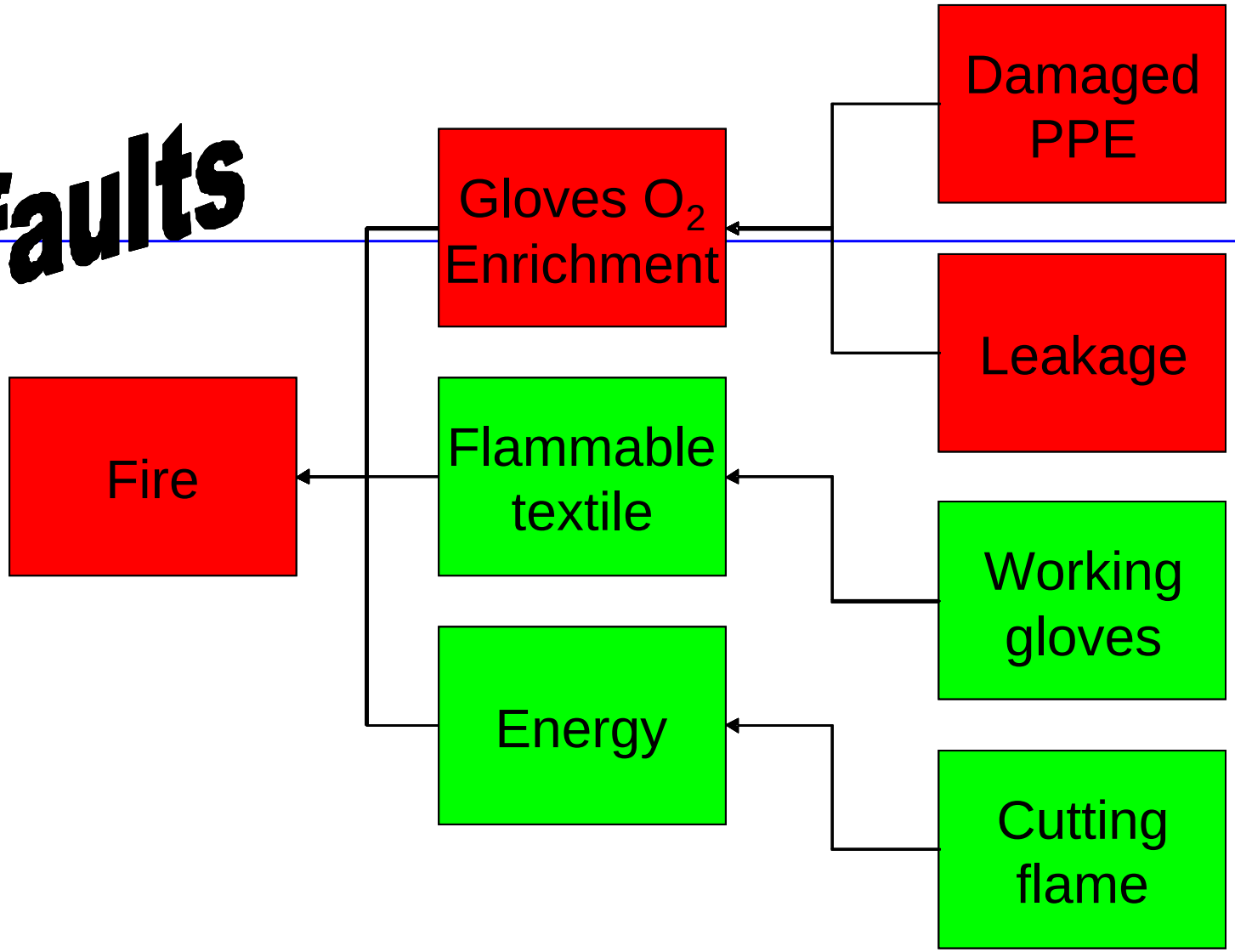
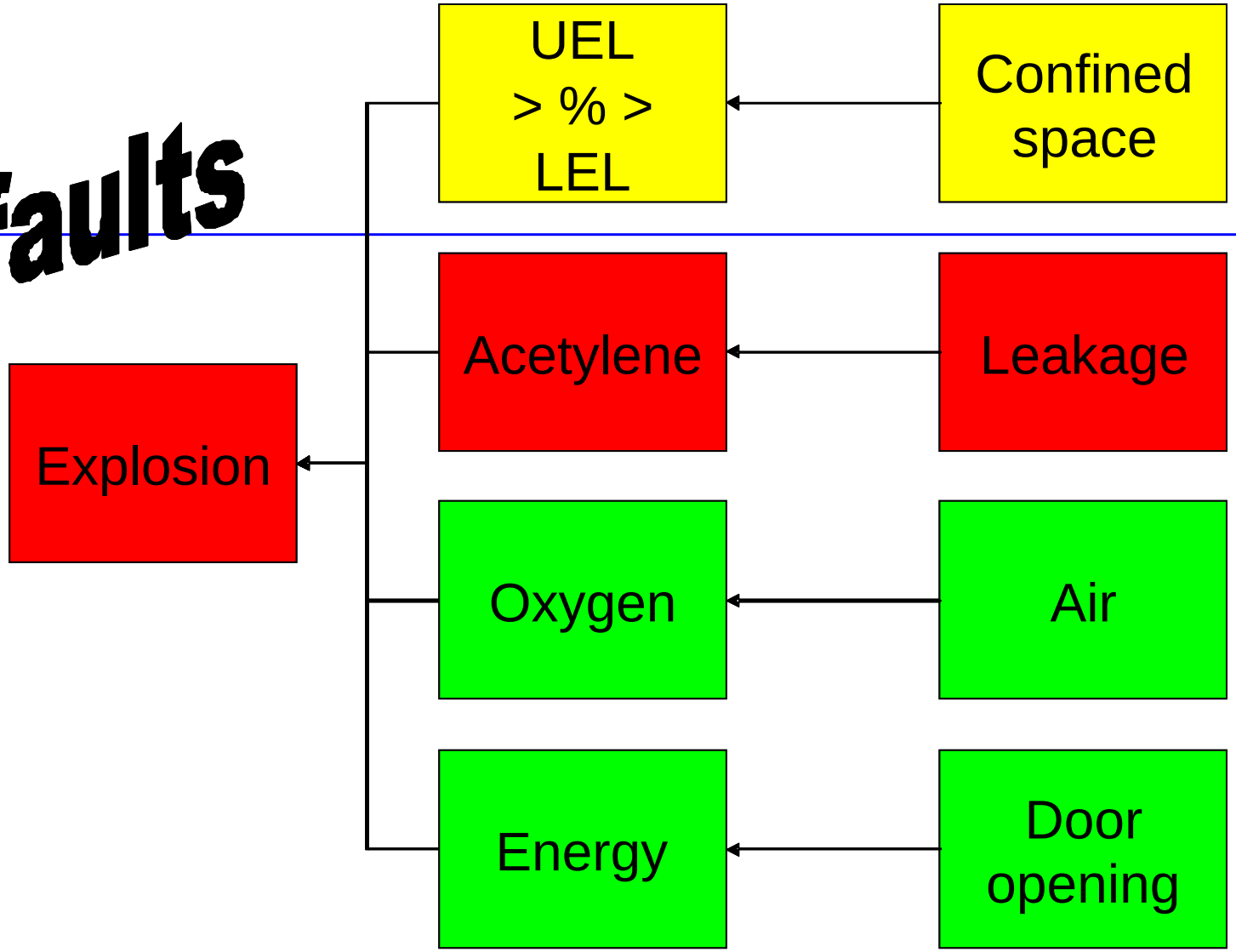
Dual faults



Root cause: human behaviour

Confined space

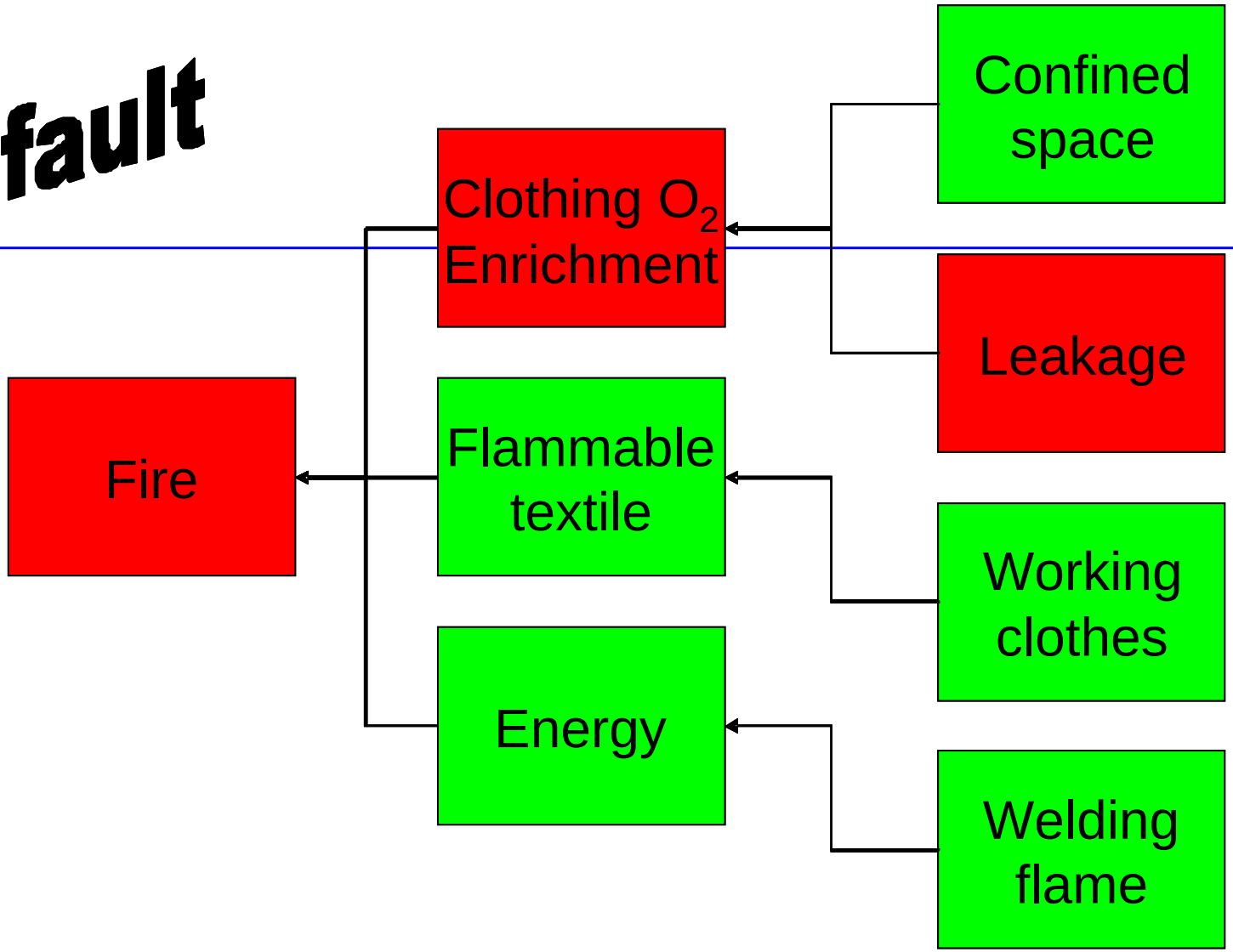
Dual faults



Root cause: human behaviour

O_2 enrichment

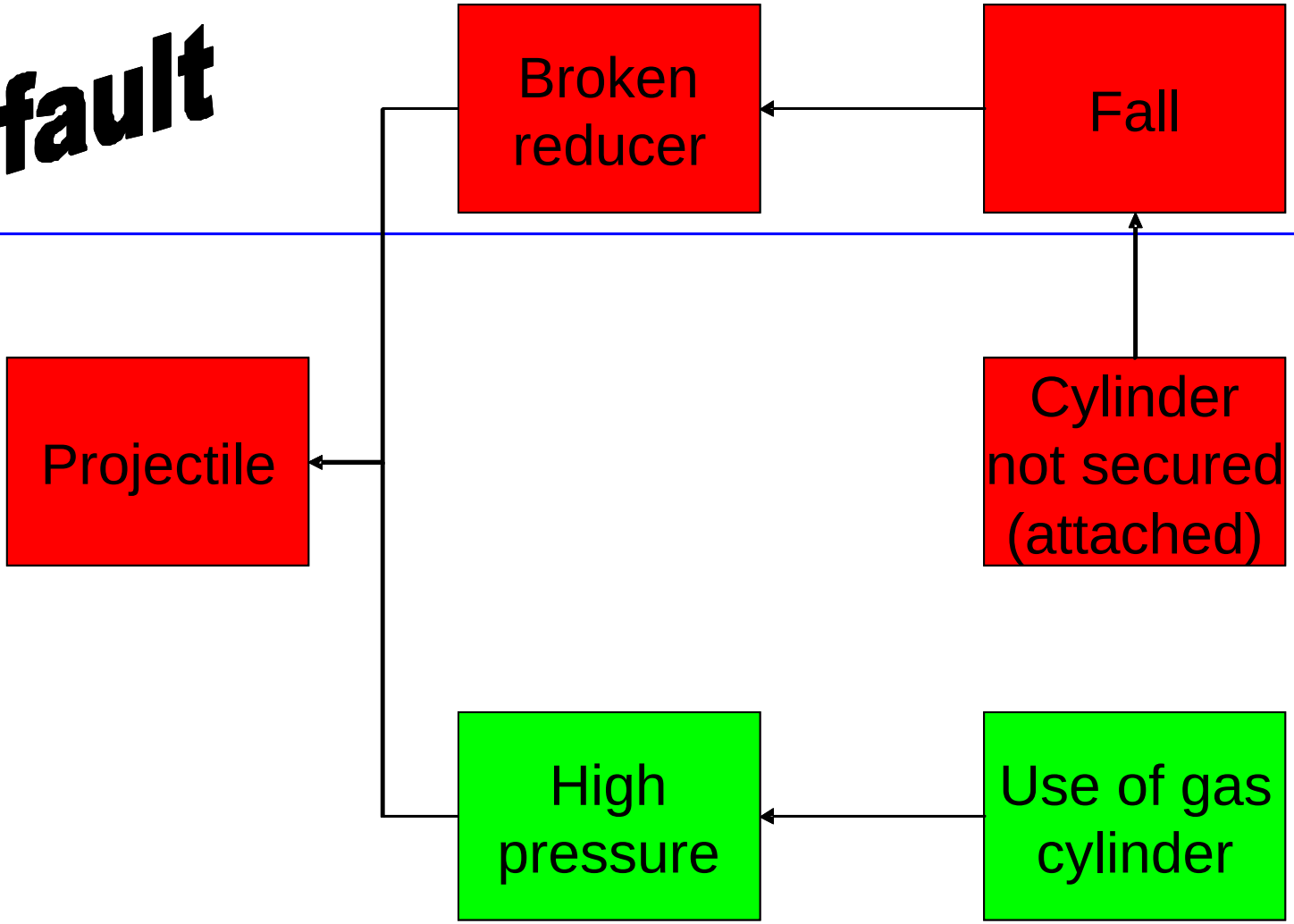
Single fault



Root cause: human behaviour

Projectile risk

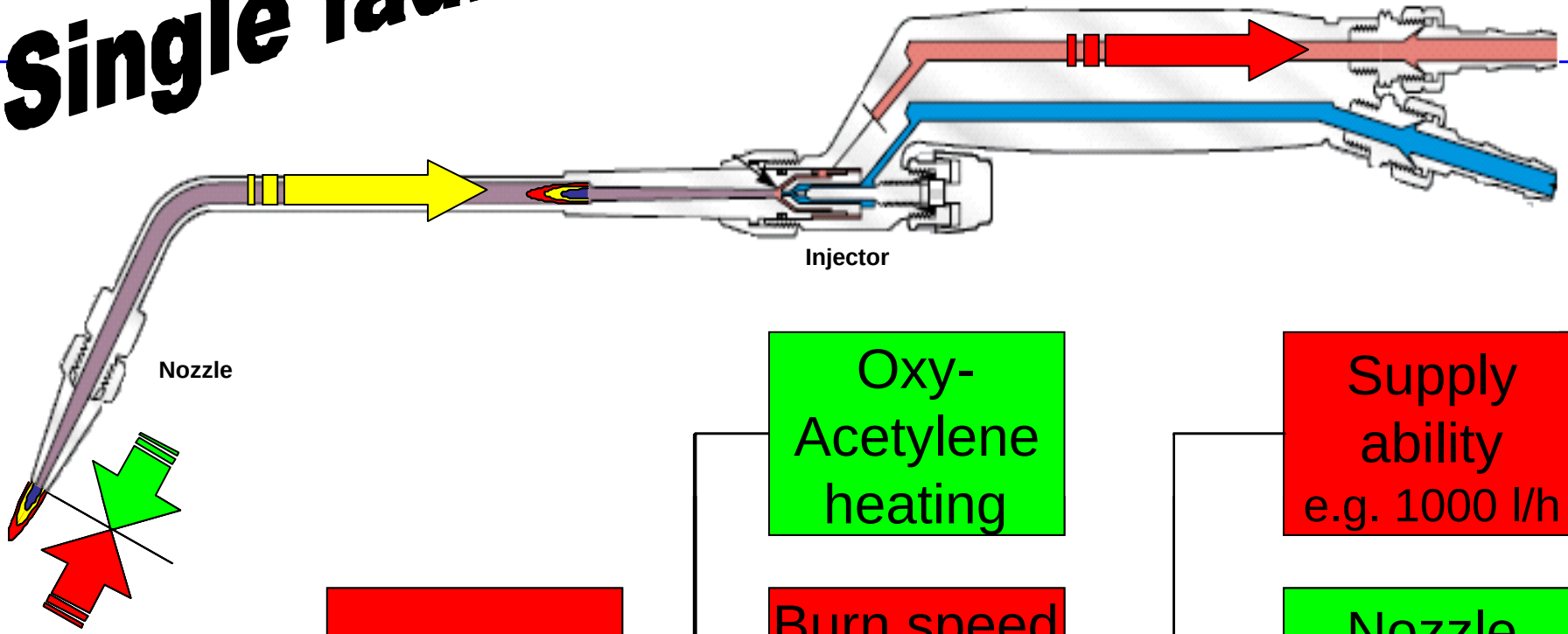
Single fault



Root cause: human behaviour

Installation

Single fault



Oxy-Acetylene heating

Supply ability e.g. 1000 l/h

Flash back

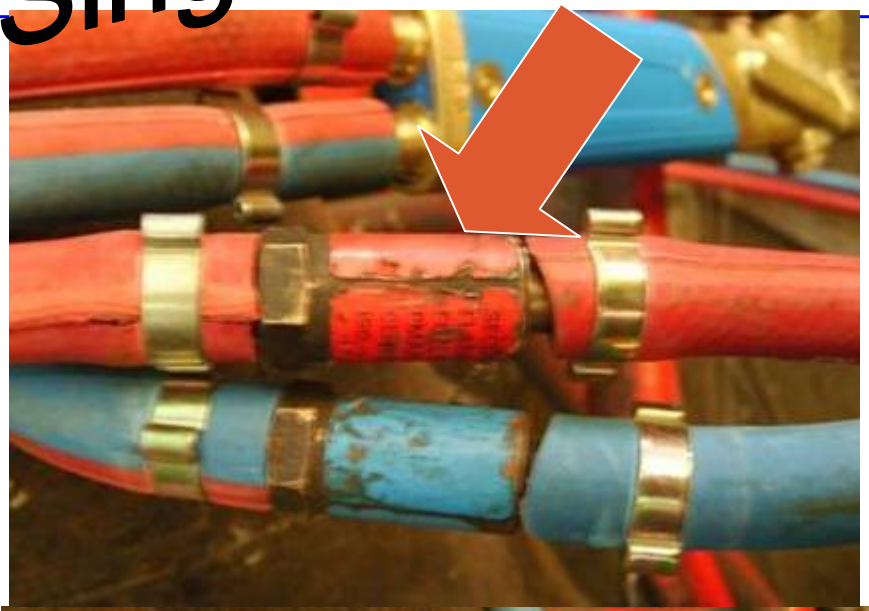
Burn speed > Flow rate

Nozzle fitted e.g. 2500 l/h

Root cause: human behaviour

Single fault

Maintenance



Root cause:: human behaviour

Single fault

Chemical incompatibility

Chemical resistance

1 = excellent resistance
2 = good resistance
3 = mediocre resistance
x = not resistant

Medium	Ester-PUR	Ether-PUR	Silicone	Hypalon®	Viton®	PVC	PE	PTFE	Neoprene	Kapton®	TPV	PO spez
butane gas	1	1	3-x	2	1	2	3-x	1	2	1	2	x
propylene (propene)	x	x	x	x	1	2		1	x	1	1	
propane gas	1	1	x	2-3	1	1	2	1	1	1	1	x

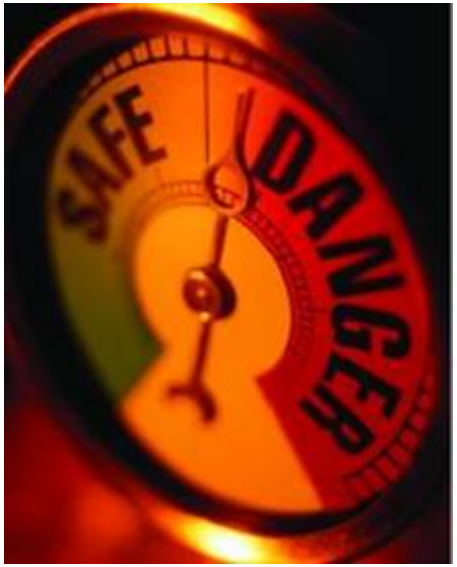
Bad use

Single fault

Cutting blowpipes are used as a “hammer” to detach the cut part. Handle integrated flashback arrestors can be damaged and leak.

Root cause: human behaviour

European Regulation



From *Prevention of Risks*

to provisions underpinned by

the ***Precautionary Principle***

Ways to *prevent incidents* used by welding manufacturer

	efficiency
Instruction Manual	+
Warning	++
Training	++
Qualification	+++
Mitigation	+++
Substitution	+++

Misuses and the *Precautionary Principle*

‘safe product’ shall mean any product which, under normal or reasonably foreseeable conditions of use does not present any risk (2001/95/CE General Product safety)

‘reasonably foreseeable misuse’ means the use of machinery in a way not intended in the instructions for use, but which may result from readily predictable human behaviour. (2006/42/CE Machinery Directive)

Difficulties introduced by the *Precautionary Principle*

Loss of knowledge leads to new "reasonably foreseeable misuses"

Precautionary Principle

leads to continuous improvement in design, and increased information flow along the supply chain to improve the safety of the user

A design for reasonably foreseeable misuse

It is not a hammer...

Behind handle, FBAs are not subjected to any effort when knocking

It is still not a hammer...

Thank you, especially to Patrick Couderc of Air Liquide for both his paper and support in presenting it

Andy Webb