Integrated Fire Engineering and Response
COST action network number TU0904 in domain Transport and Urban Development

April 10-11, 2012, Malta

Fire Brigade Reports and Investigations in Italy: Procedures and Statistics

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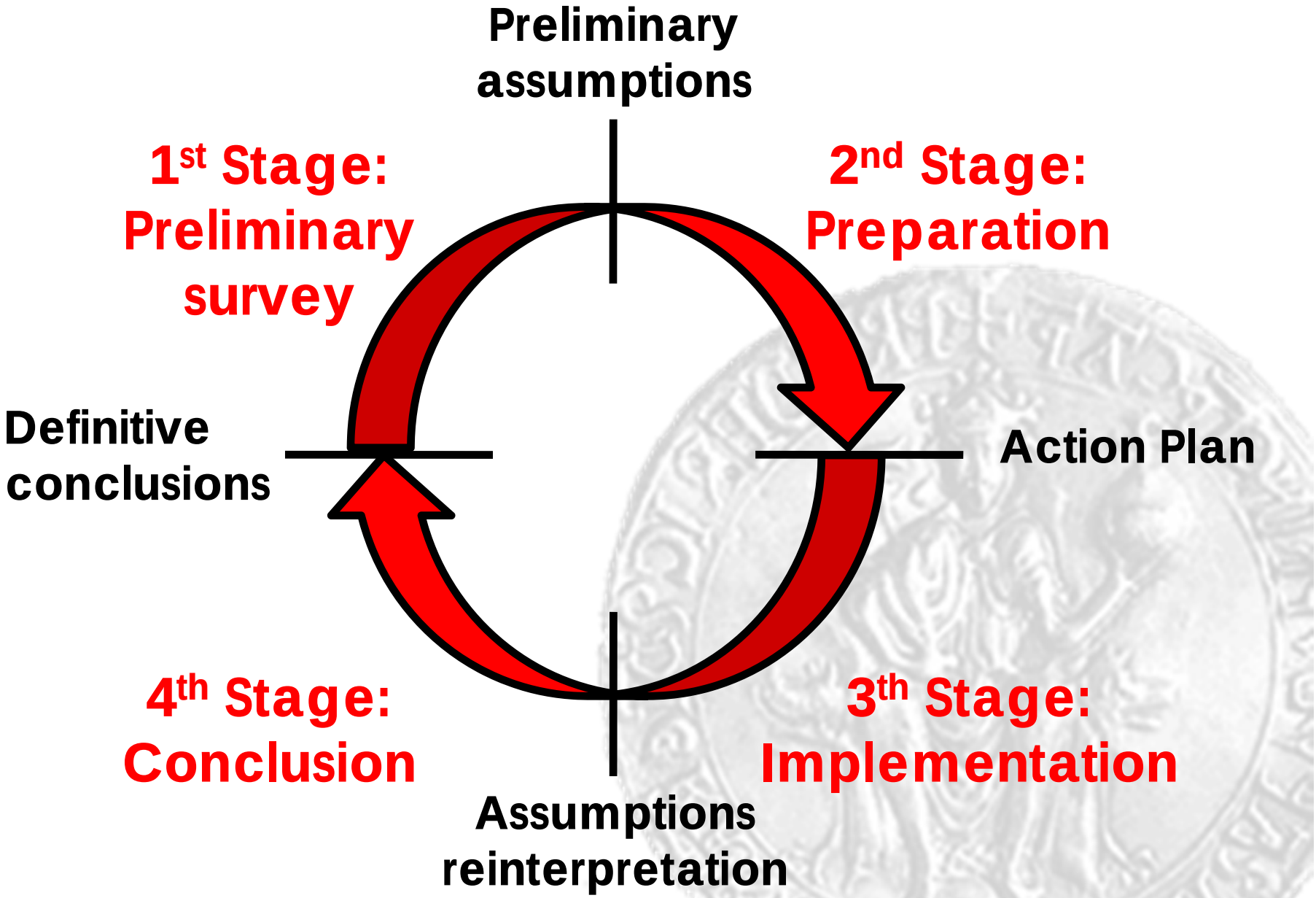
Fire Investigation Team

In 2004, the ITALIAN NATIONAL FIRE ORGANIZATION was endowed with specialized Teams for Fire Investigation (NIA)

The NIA provides to:

- ✓ **carry out investigative activity in case of accidents caused by fire and/or explosion, focused on the search of the causes of the accidents**
- ✓ **make inquiries vo er measures must be adopted in s ' safety**
- ✓ **support, as inv e cial Fire Stations in their urgent i ec d, if necessary, in judicial attac , ng else useful to establish the c**
- ✓ **research and experiments in the field of Fire Investigation**
- ✓ **train the fire investig ia**

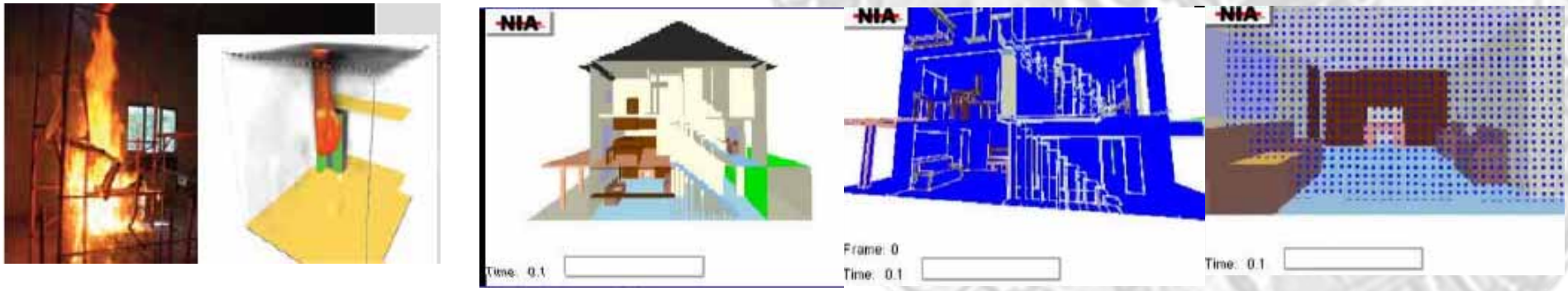
N.I.A. : Procedures for investigation



N.I.A.: Procedures and techniques for research and investigation

The NIA has a test-laboratory located in the area of the Operational Training School of Montelibretti (Rome, Italy), where fire simulations on full-scale and fire scenarios are carried out.

The parameters checked during full-scale fire experiments are then compared, through numerical model, with the output data of simulations carried out under the same conditions.

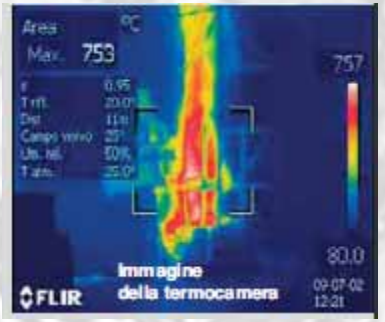


N.I.A.: instrumentation for research and investigation

The intervention vehicle used by the NIA is a mobile laboratory, a camper specifically equipped with systems for the environmental monitoring operations, for detecting flammable substances, for producing evidence, and for judicial attachment. It allows also to take immediately minutes of the Fire investigation procedures followed in the intervention and to produce the documents of the conducted Investigation.

The PID (Photo Ionization Detector) is used to detect vapours of volatile organic compounds. Inflammable liquids are among the substances the PID can detect.

The Thermocamera is an infrared monitoring system which allows to calculate and to display the temperature.
It contains all the tools and instruments necessary to be used for the judicial attachment

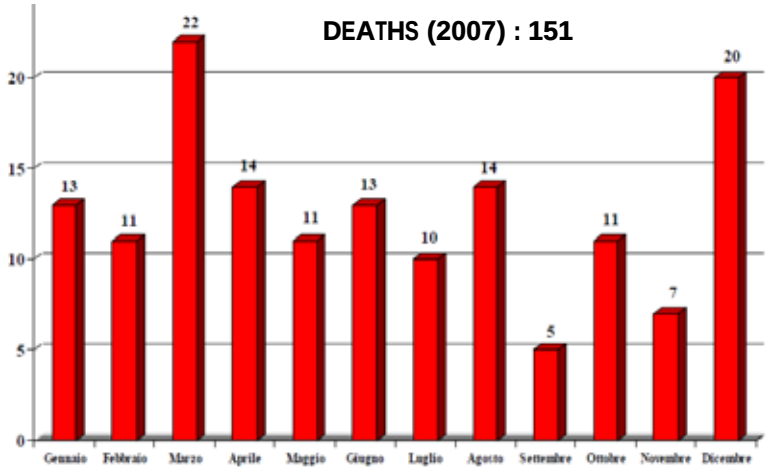


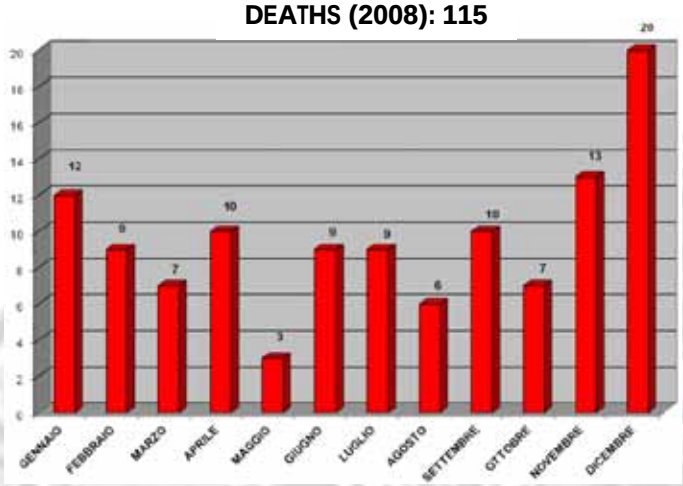
The SceneScam System is endowed with a scanner with a resolution of 5300 vertical pixels and 10.600 horizontal pixels. It can film with 26 different opening times of the diaphragm and allows to obtain a spherical image of an environment.

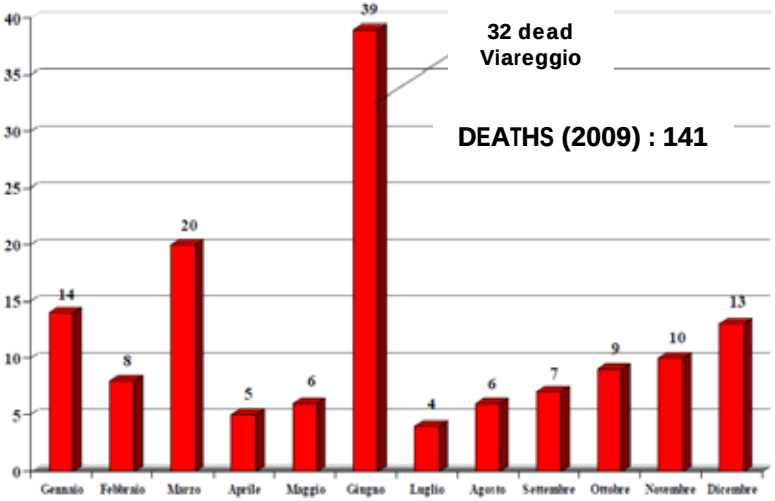
Statistics

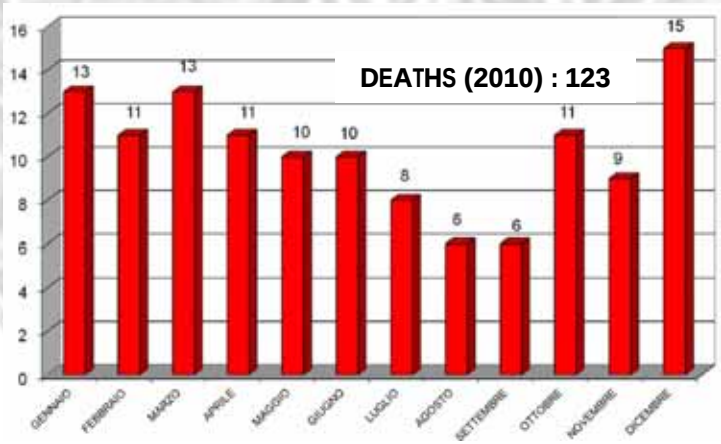
A research has examined all the reports received by the National Operations Centre of the Ministry of the Interior, relating to fires and explosions occurred in Italy, in the time period between 2007and 2010. The research gives information about deaths in consequence of fires and explosions, providing useful data not only for accident prevention, but also for the organizational management of the rescue of the National Fire Brigade.

Death's distribution by months









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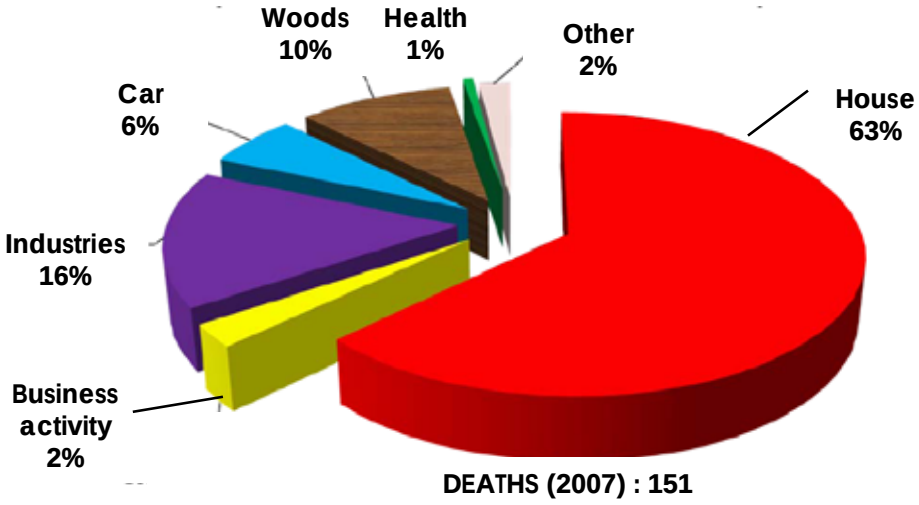
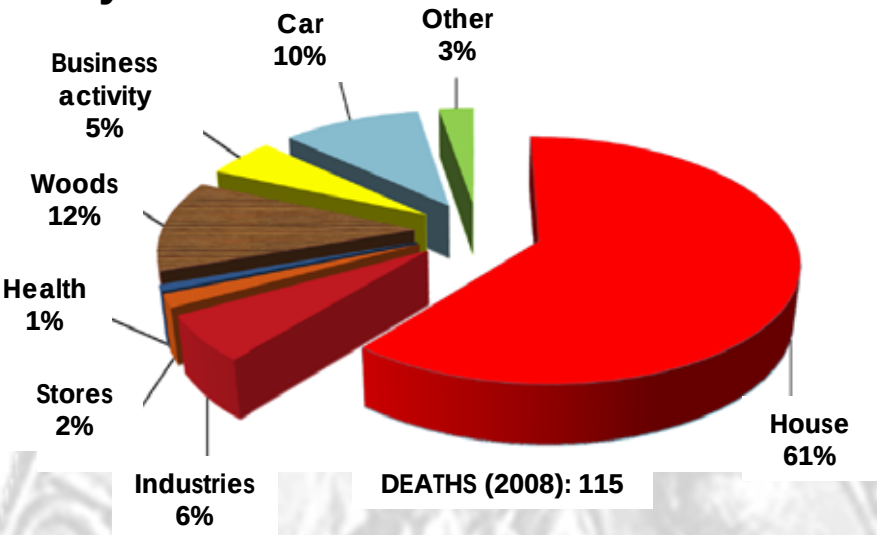
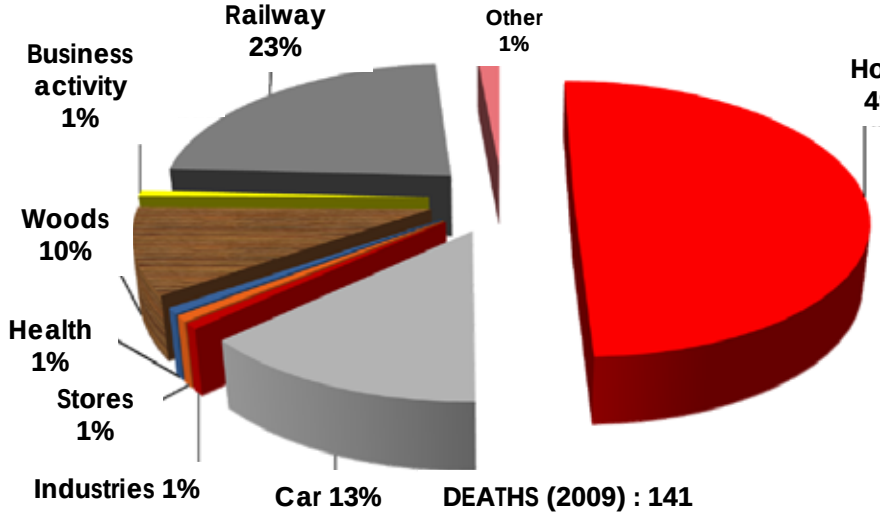
Death's distribution by activities



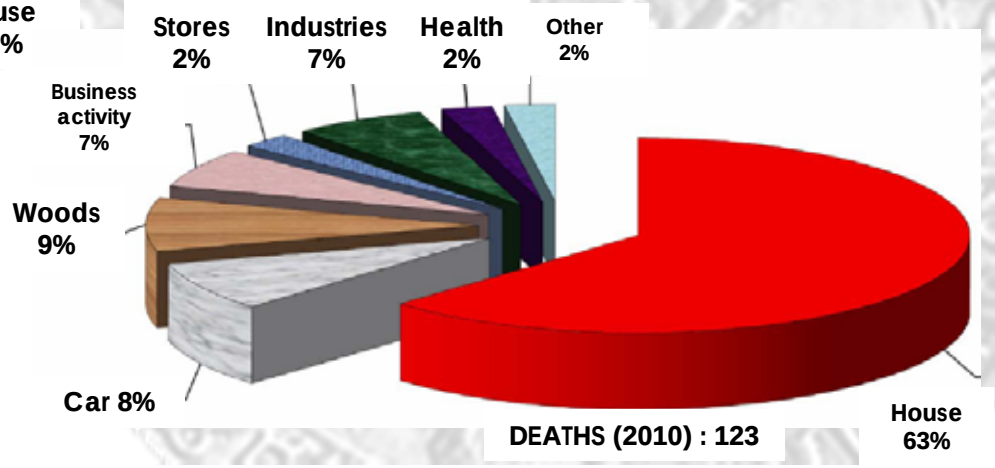
DEATHS (2007) : 151



DEATHS (2008): 115



DEATHS (2009) : 141



DEATHS (2010) : 123

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Fire Brigade Reports and Investigations in Italy: Description of Real Fires

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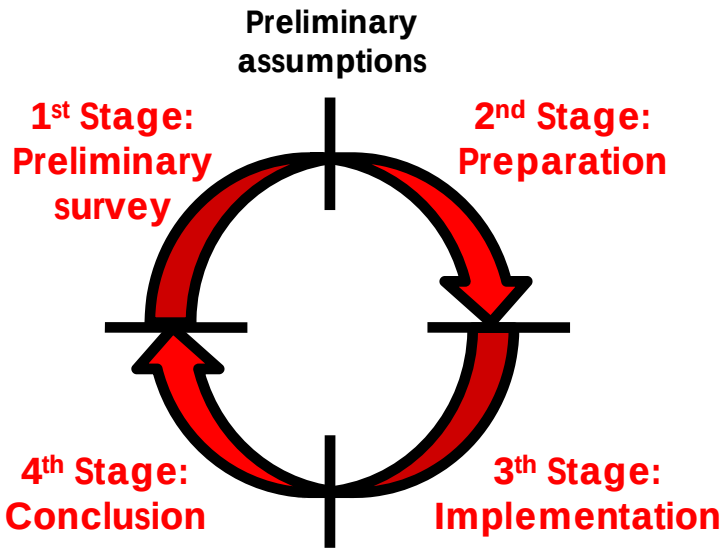
A real investigative asset

In 2008: fire of cars parked in a residential building.
Building's description:
✓ total length:120 m;
✓height: 27 m;
✓8 floors above ground.

Fire involved 39 cars and 17 motorcycles.
The fire caused the rupture of water, gas and electrical systems.
The fire caused the evacuation of the building.

A real investigative asset: 1st Stage



Evidence collection: based on first evidence, fire is started from a car;

Analysis of reports of first rescuers: fire has reached the flash-over in the ground floor;

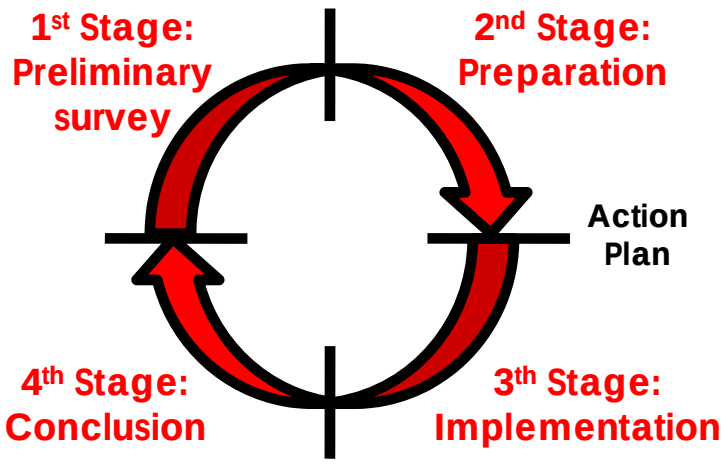
Analysis of video produced : a video, posted on line, confirms the assumption about the flash-over and permits the calculation of time in which the flash-over has reached (20-25 min, with a spread of 12-8 cm/s);

Analysis of fire's report with the same characteristics: it easily allows to express *temporary assumptions* about the causes of fire.

Preliminary assumptions:

- ✓ ***Fire could be ignited due to failure of car's electrical equipment or use of open flames or use of liquid fuel.***
- ✓ ***Based on the analysis of fire developed in a building with the same characteristics, flash-over could be reached due to dripping of the polystyrene used for the insulation of the ceiling***

A real investigative asset: 2nd Stage

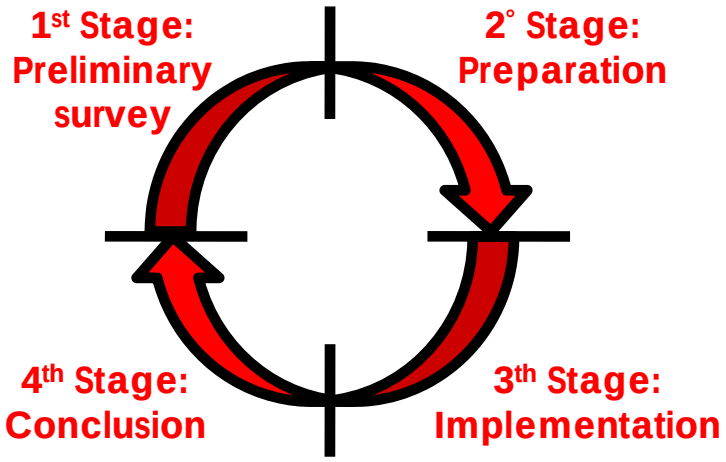


- ✓ **Need for checking: a) the presence of liquid fuel (substances that accelerate the fire's development as petrol) and solid fuel (substances able to ignite fire); b) failure of car's electric equipment;**
- ✓ **Need for checking the assumption about the dripping of polystirene and its ability to spread the fire to the other vehicle.**

Action plan:

- ✓ ***inspection aimed to verify:***
  the presence of liquid fuel, by using P.I.D.;
  the presence of solid fuel;
- ✓ ***inspection of car from which fire started;***
- ✓ ***fire reaction test of polystirene in accordance with*** **"UNI-CNVVF 9174".**

A real investigative asset: 3th Stage

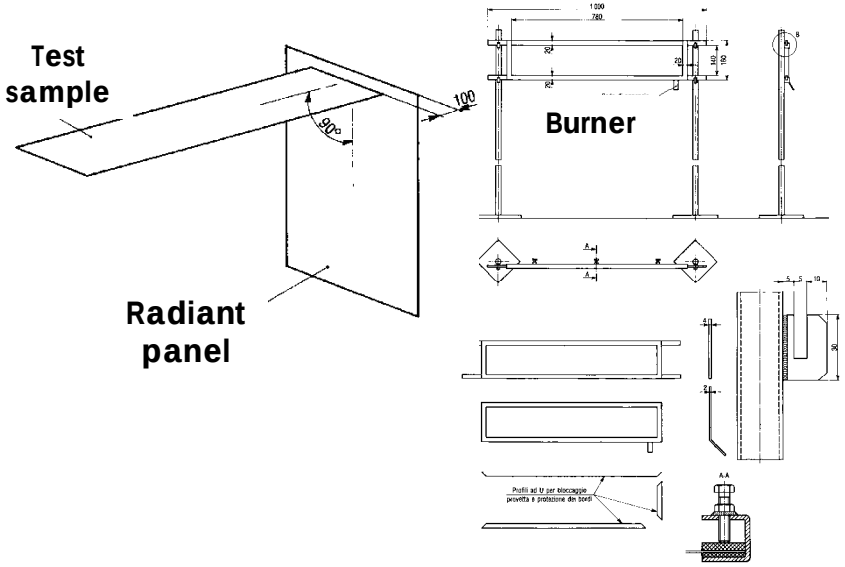


Assumptions reinterpretation

- ✓ Monitoring of presence of liquid fuel is performed along the covered street, intended for the transit of vehicles incoming and outgoing, and near the tanks of cars. The instrument result was negative
- ✓ Evidence collection of polystirene to be tested in accordance with "UNI-CNVVF 9174", aimed to define the fire spread, the damaged area, the polystirene's dripping.

Test description:

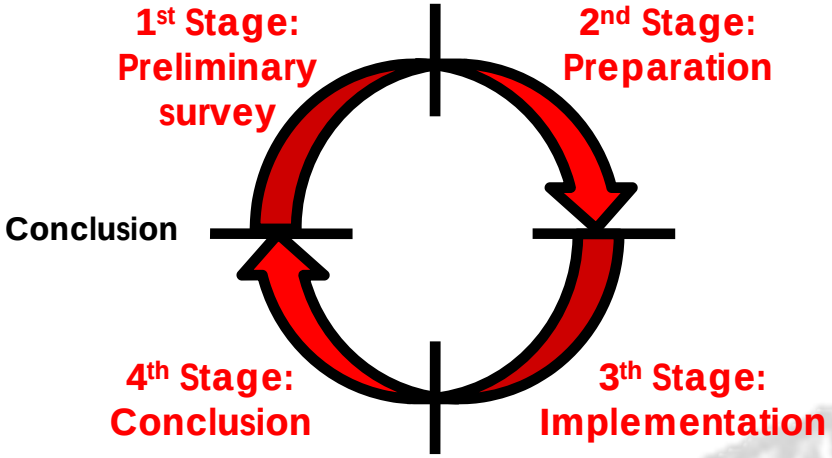
Test sample



Test instrumentation

The tester, made up polystirene and a thin layer of plaster, has been ignited with a pilot flame. In the ground was placed a portion of a tire of a car in order to verify if the dripping of burning material could be able to ignite it.

A real investigative asset: 4th Stage



- ✓ The P.I.D. didn't detect the presence of liquid fuel, even near the tanks; therefore the result isn't reliable because all the fuel is burned;
- ✓ The presence of solid fuel wasn't detected;
- ✓ The car from which fire started was completely destroyed; therefore it isn't possible to verify the electrical failure;
- ✓ The small portion of tested polystirene was able to ignite a tire of car following the dripping; therefore it is reliable that in situ other cars were involved in fire due the dripping of large size of material.

REQUIREMENTS: it is necessary that the material, used as a coating in buildings, is protected from the fire. As recommended from EUMEPS, the protection can be realized with a layer of plaster thickness of 9-10 mm minimum, because it was shown that this is sufficient to reduce the possibility of ignition, provided that the coating layer is mechanically anchored.

Thanks for your attention