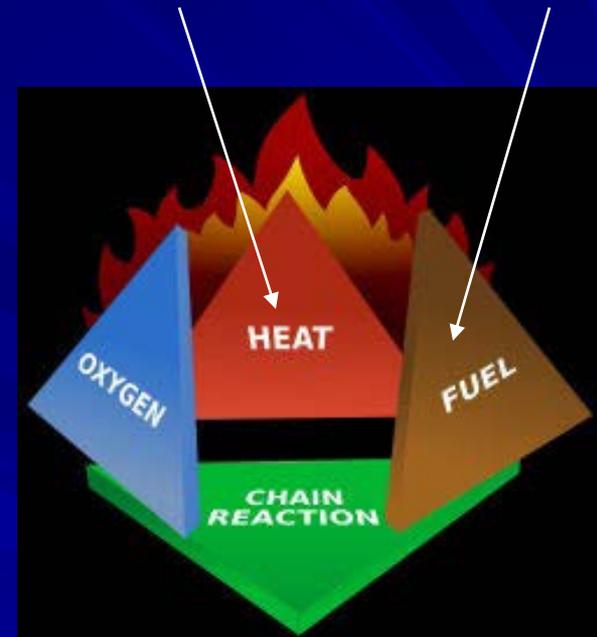


Bilancia Ignition Matrix TM

Bilancia Ignition Matrix™ Approach

- Developed by Lou Bilancia, P.E., Oregon
- This approach exhaustively compares all potential ignition sources and all first fuels in the room of origin.



The Matrix

- Exhaustive pair-wise comparison designed to systematically evaluate numerous ignition sources and document how each was or was not competent to ignite a particular first fuel
- All potential ignition sources listed across the top and all possible first fuels down the side.
- Each square then represents a pair-wise assessment of the interaction between each fuel and each source

Source ----- Fuel	clock radio	cell phone charger	cigarette	candle	compact fluorescent lamp	plug-in room refresher
Lace night table cover	1. yes (a) 2. yes, close 3. no (d) 4. yes path	1. yes (a, c) 2. not close 3. 4. yes	1. 2. yes close 3. no evid. 4.	1. yes comp 2. yes 3. maybe 4. yes	1. yes (a, c) 2. yes 3. no (d) 4. yes gravity	1. yes (a) 2. not close 3. no (d) 4.
Sheets or covers	1. no (c) 2. not close 3. no (d) 4. yes gravity	1. yes (a, c) 2. yes close 3. no (d) 4. yes	1. 2. not close 3. no evid. 4.	1. yes comp 2. not close 3. 4.	1. yes (a, c) 2. no 3. no (d) 4. no	1. yes (a) 2. yes close 3. 4.
Curtains	1. no (c) 2. not close 3. no (d) 4. yes path	1. yes (a, c) 2. yes close 3. no (d) 4. yes	1. 2. not close 3. no evid. 4.	1. yes comp 2. not close 3. 4.	1. yes (a, c) 2. no 3. no (d) 4. yes shade	1. yes (a) 2. yes close 3. no (d) 4.
Plastic decorative flowers	1. no (c) 2. not close 3. no (d) 4.	1. yes (a, c) 2. not close 3. no (d) 4. no	1. not comp. 2. 3. no evid. 4.	1. yes comp 2. yes close 3. maybe 4. yes	1. no (a, c) 2. no 3. no (d) 4. yes shade	1. no (a, c) 2. not close 3. no (d) 4. no
Lamp shade	1. yes comp 2. not close 3. no (d) 4. yes path	1. yes (a, c) 2. not close 3. no (d) 4. no	1. 2. not close 3. no evid. 4.	1. yes comp 2. not close 3. indirect 4. yes path	1. no (a, c) 2. yes close 3. no (d) 4. yes	1. no (c) 2. not close 3. no (d) 4. no

Evaluation

- Each combination is the evaluated on four primary values:
 1. Is this ignition source competent top ignite this fuel – yes or no?
 2. Is this ignition source close enough to this fuel to be capable of igniting it – yes or no?
 3. Is there evidence of ignition – yes or no?
 4. Is there a pathway for a fire ignited in this fuel to ignite the main fuel – yes or no?

Assessment

- Comments or notes on each evaluation
 - This source was not energized (appliance or power cord) or not in use (candle)
 - “Too far away” or “Depends on duration being adequate” or “Unknown – must test exemplar”
 - Physical or visual evidence of burning, ignition was witnessed or recorded on video
 - Plume developed from first fuel sufficient or ignited by flashover

Bilancia Ignition Matrix™

- Finally the matrix can be color-coded to indicate which combinations are capable, which are excluded, and which need further data

- For example:

- Red: Competent and close
- Blue: Not competent
- Yellow: Competent but ruled out

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Lace night table cover	1. yes (a) 2. yes, close 3. no (d) 4. yes path	1. yes (a, c) 2. not close 3. 4. yes	1. 2. yes close 3. no evid. 4.	1. yes comp 2. yes 3. maybe 4. yes	1. yes (a, c) 2. yes 3. no (d) 4. yes gravity	1. yes (a) 2. not close 3. no (d) 4.
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Curtains	1. no (c) 2. not close 3. no (d) 4. yes path	1. yes (a, c) 2. yes close 3. no (d) 4. yes	1. 2. not close 3. no evid. 4.	1. yes comp 2. not close 3. 4.	1. yes (a, c) 2. no 3. no (d) 4. yes shade	1. yes (a) 2. yes close 3. no (d) 4.
Plastic decorative flowers	1. no (c) 2. not close 3. no (d) 4.	1. yes (a, c) 2. not close 3. no (d) 4. no	1. not comp. 2. 3. no evid 4.	1. yes comp 2. yes close 3. maybe 4. yes	1. no (a, c) 2. no 3. no (d) 4. yes shade	1. no (a, c) 2. not close 3. no (d) 4. no
Lamp shade	1. yes comp 2. not close 3. no (d) 4. yes path	1. yes (a, c) 2. not close 3. no (d) 4. no	1. 2. not close 3. no evid 4.	1. yes comp 2. not close 3. indirect 4. yes path	1. no (a, c) 2. yes close 3. no (d) 4. yes	1. no (c) 2. not close 3. no (d) 4. no

Bilancia Ignition Matrix™ Example

■ Kitchen Fires:

- Numerous first fuels
 - Fixed and occasional
- Numerous heat sources
 - “Intentional” and accidental

Even more!

Ignition Sources & Fuels



A little harder after the fire



Bilancia Ignition Matrix™

- Applicable to any fire scene, once the room or area of origin has been determined

The Key Element: The Treasure Map



Color Aids Interpretation

Source ----- Fuel	clock radio	cell phone charger	cigarette	candle	compact fluorescent lamp	plug-in room refresher
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Curtains	1. no (c) 2. not close 3. no (d) 4. yes path	1. yes (a, c) 2. yes close 3. no (d) 4. yes	1. 2. not close 3. no evid. 4.	1. yes comp 2. not close 3. 4.	1. yes (a, c) 2. no 3. no (d) 4. yes shade	1. yes (a) 2. yes close 3. no (d) 4.
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Lamp shade	1. yes comp 2. not close 3. no (d) 4. yes path	1. yes (a, c) 2. not close 3. no (d) 4. no	1. 2. not close 3. no evid 4.	1. yes comp 2. not close 3. indirect 4. yes path	1. no (a, c) 2. yes close 3. no (d) 4. yes	1. no (c) 2. not close 3. no (d) 4. no

A nightmare of fuels



Vehicles - Lots of Both!



Bilancia Ignition Matrix™ Approach

- Encourages the investigator to consider a comprehensive range of alternative hypotheses and consider each one on the basis of factors such as: heat release rate, heat flux, separation distances, thermal inertia, and routes of fire spread.
- It is an exhaustive approach using the true intent of the scientific method
- A completed matrix offers a concise demonstration that all potential ignition sources have been considered and all (but one, presumably) has been eliminated
- It is a critical part of your documentation of the investigation.
- Deliberate ignition with open flame can be included.
- Note that this comprehensive approach is NOT the casual “process of elimination” that NFPA 921 strongly cautions against using (NFPA 921, 2011 ed., pt.18.6.5)