

Accident Investigation Root Cause Analysis



Root Cause Analysis

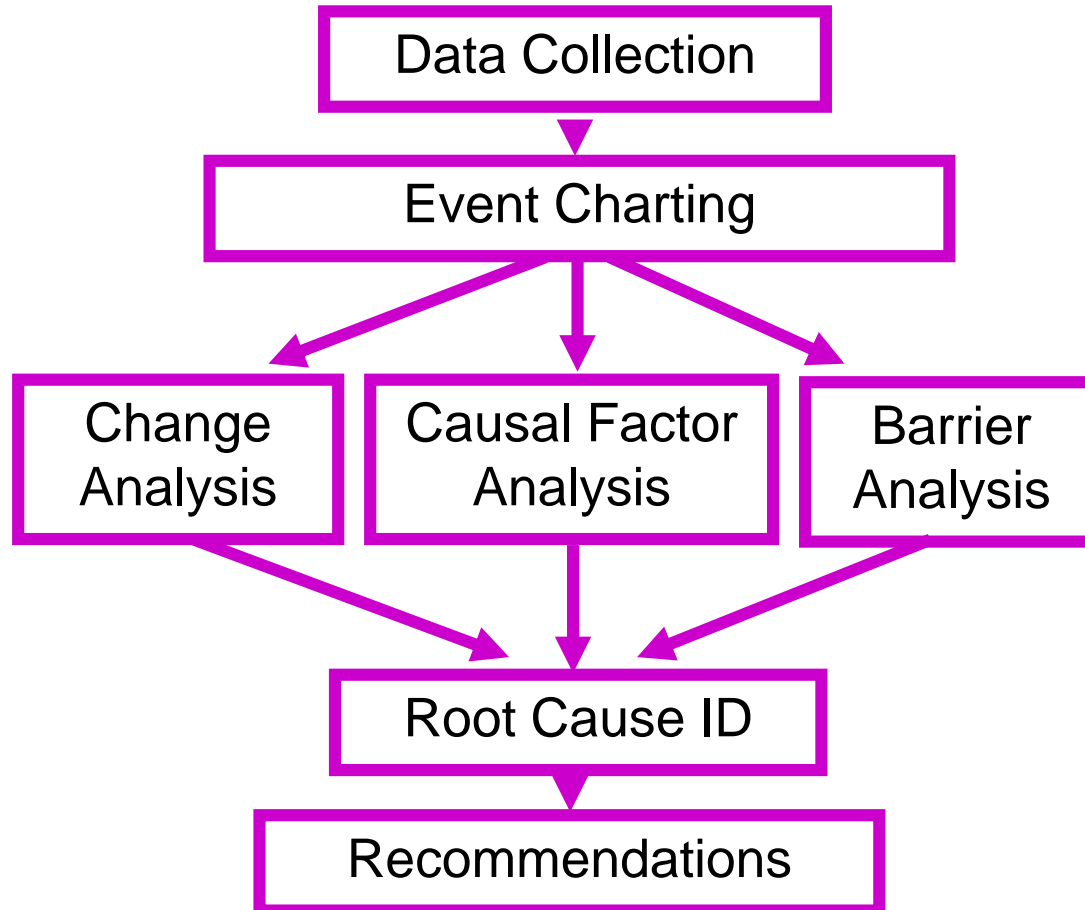
Objectives

- Identify three consistent and systematic approaches to investigating workplace accidents.
- Understand how to apply these approaches to a workplace accident investigation.



Root Cause Analysis

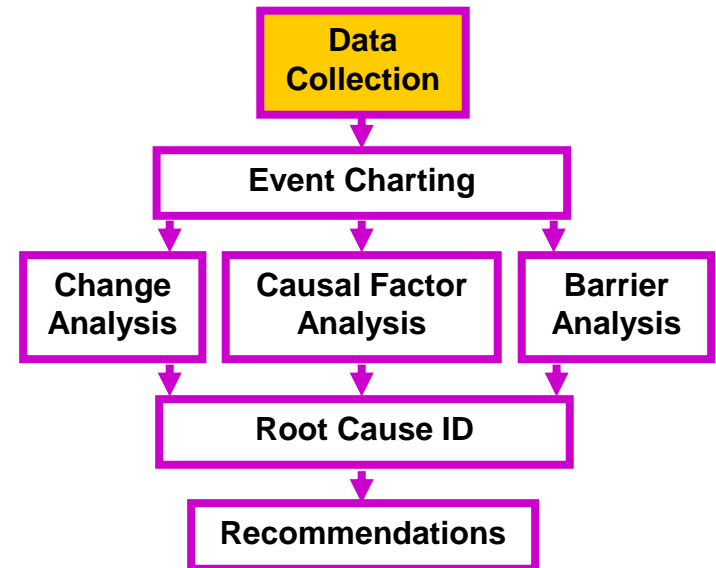
Overview



Root Cause Analysis

Data Collection

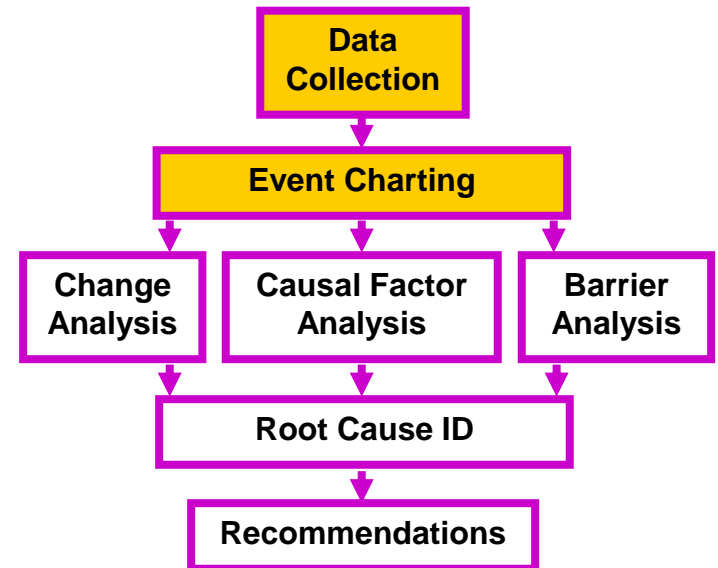
- Interviews
- Photographs
- Equipment Specs.
- Equipment Manuals
- Safety Rules
- Training Records



Root Cause Analysis

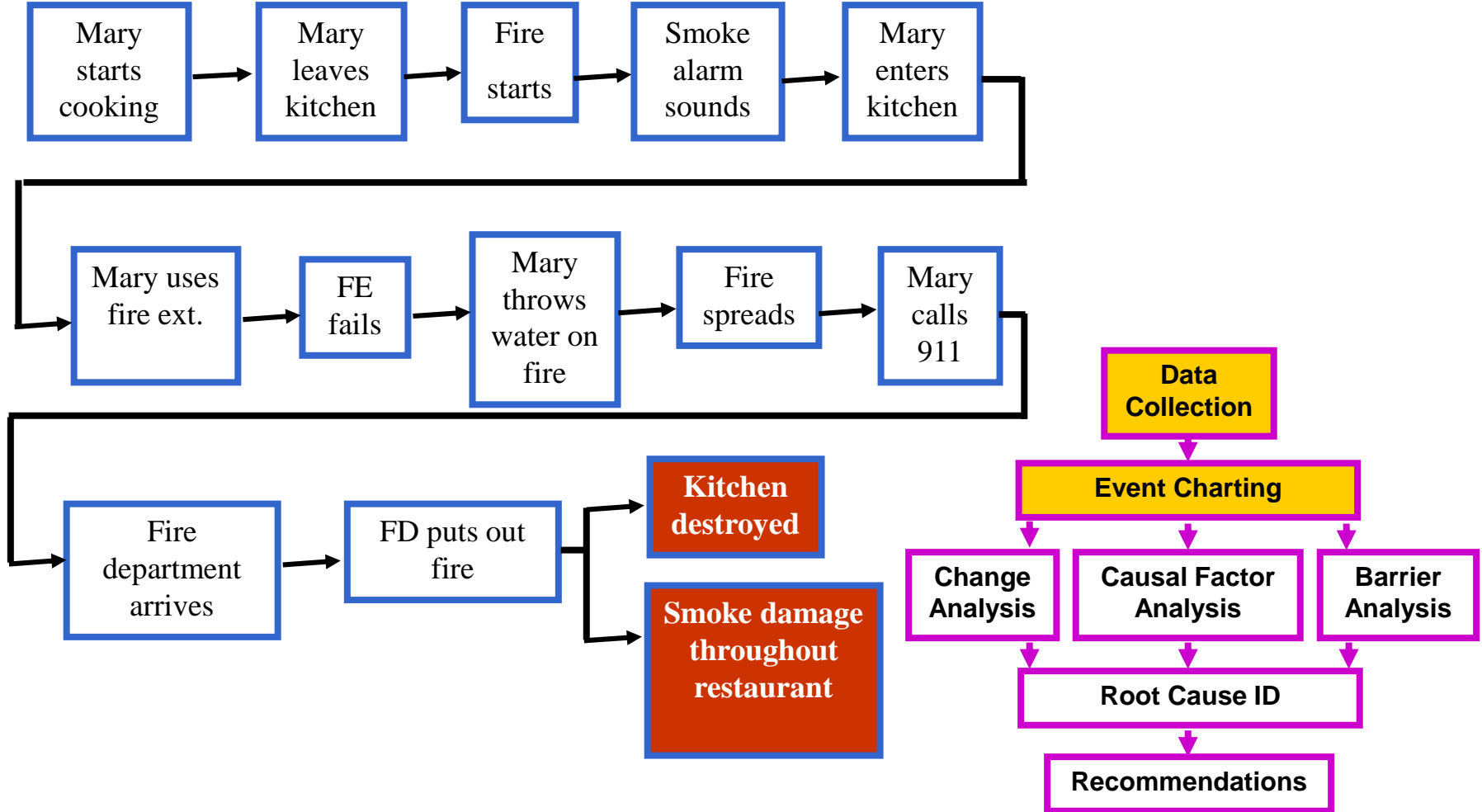
Event Charting

- Organizes collected data for analysis
- Sequence diagram
- May uncover needs for additional data collection



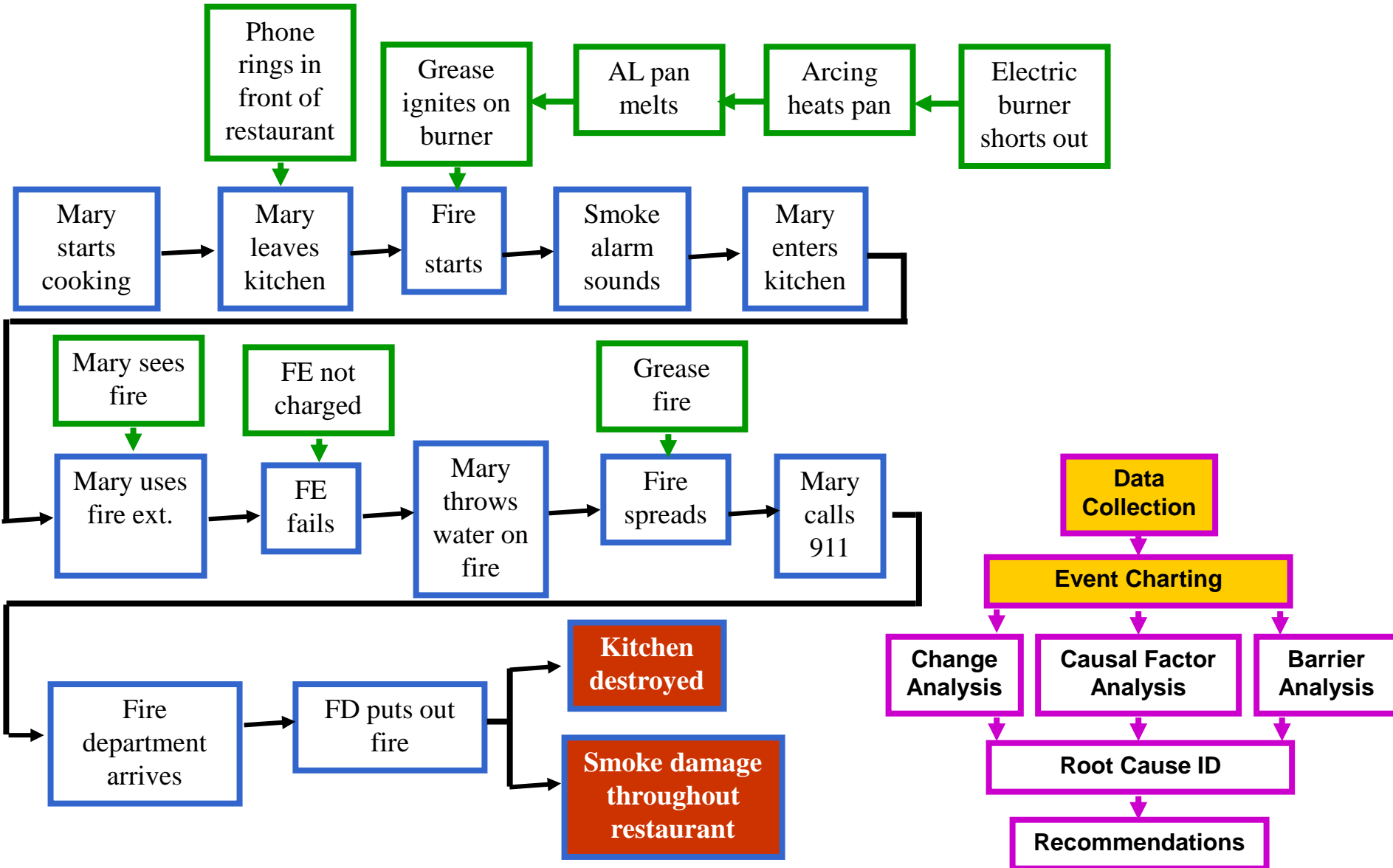
Root Cause Analysis

Event Charting



Root Cause Analysis

Event Charting

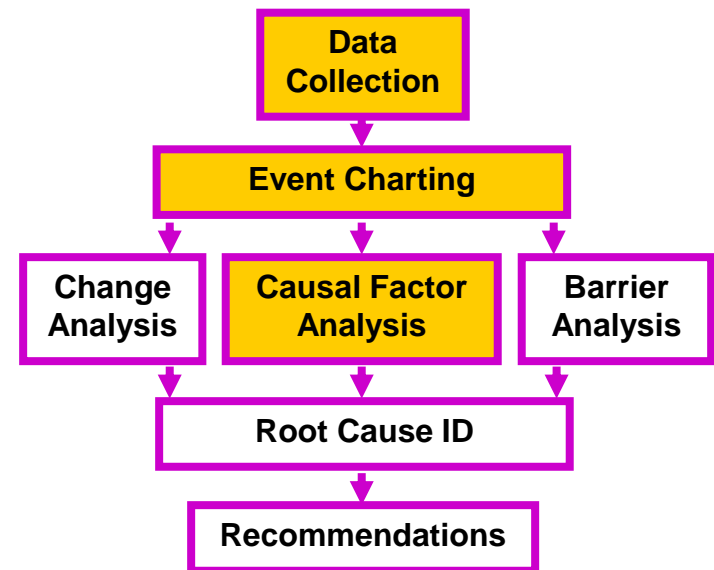


Root Cause Analysis

Causal Factor Analysis

Casual Factors:

- 1. Direct Cause:** Immediate event/ condition that caused accident)
- 2. Contributing Cause:** Event/condition that increased probability or severity of the accident
- 3. Root Cause:** Event/condition that, if corrected, will prevent recurrence

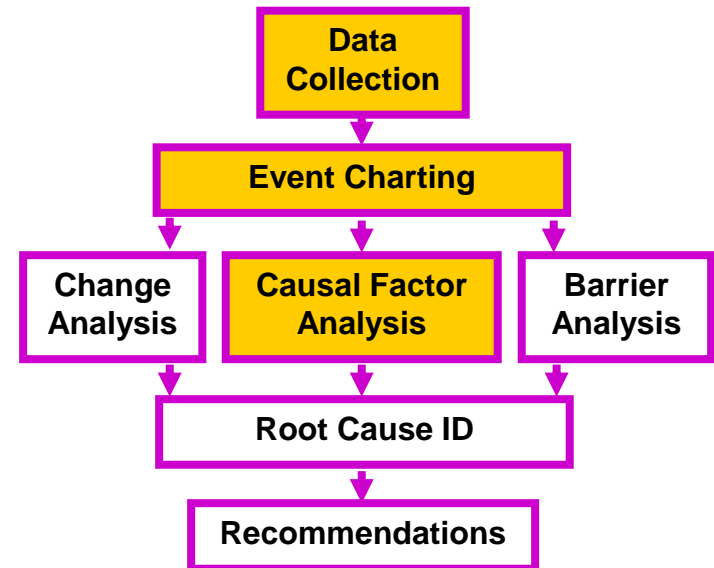


Root Cause Analysis

Causal Factor Analysis

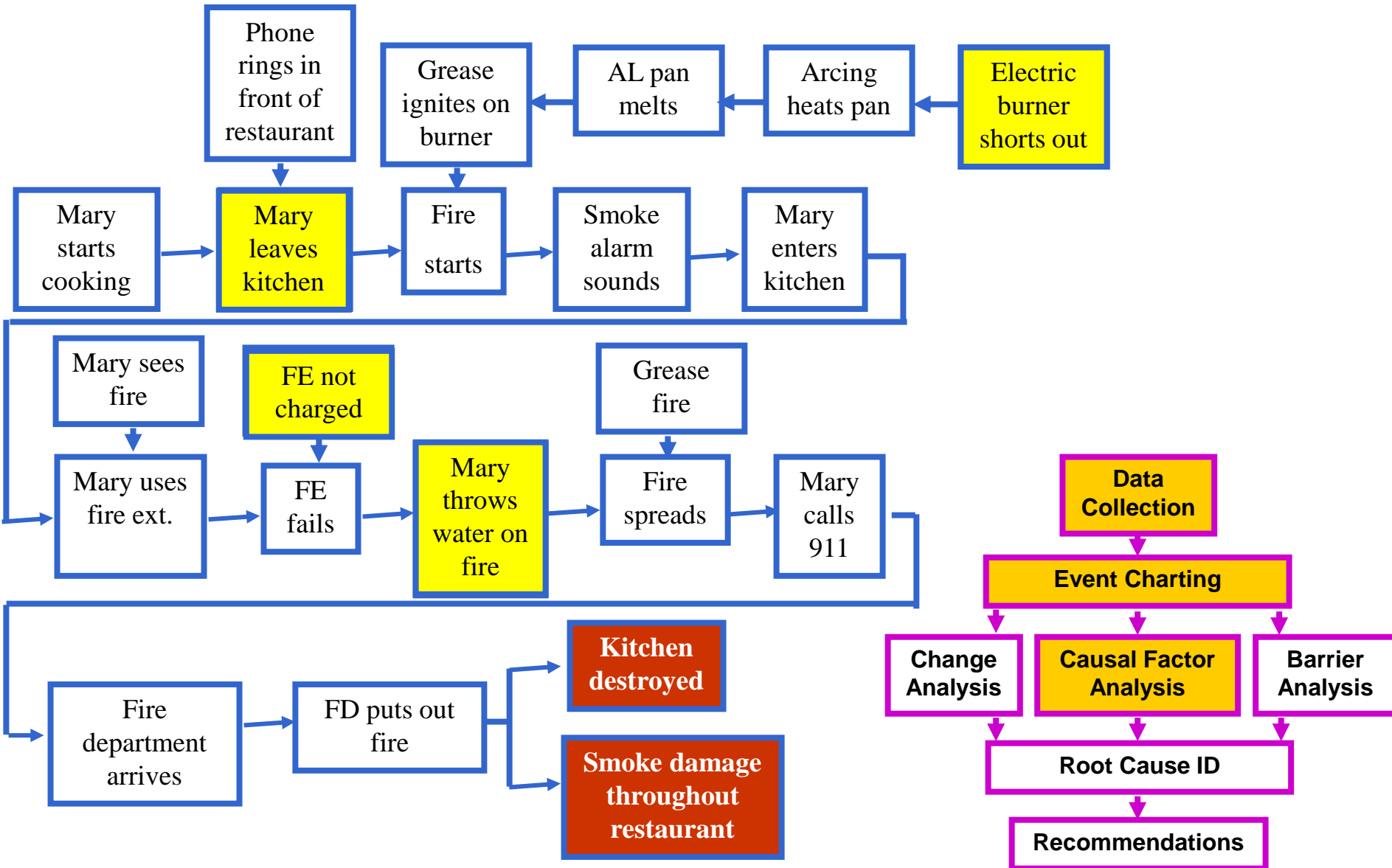
Potential Causal Factors:

- Lack of awareness
- Lack of safe work practices
- Lack of adherence/enforcement to safe work practices
- Improper/inadequate equipment/materials
- Improper/inadequate design



Root Cause Analysis

Causal Factor Analysis

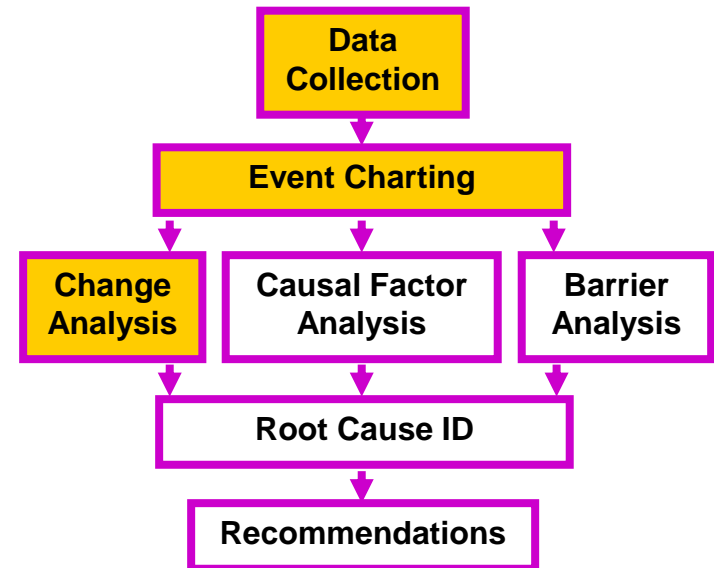


Root Cause Analysis

Change Analysis

Used to identify deviations from the norm

- “What happened” vs. “What should have happened”
- Used mostly when operations and standardized

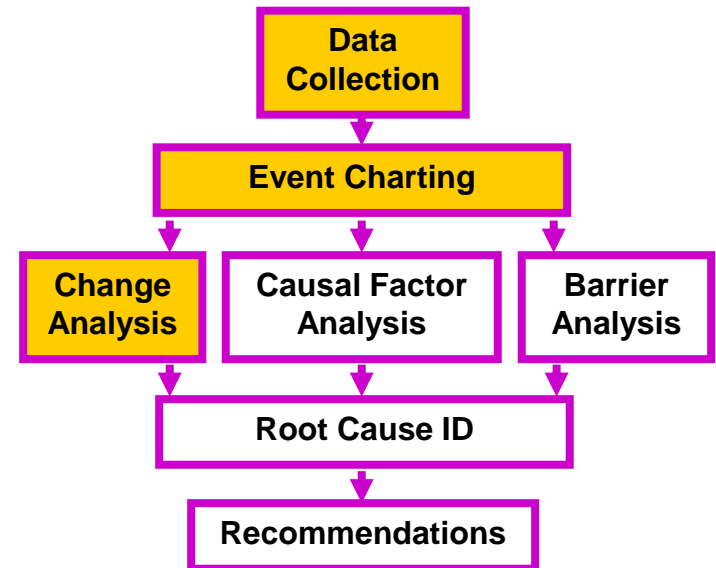


Root Cause Analysis

Change Analysis

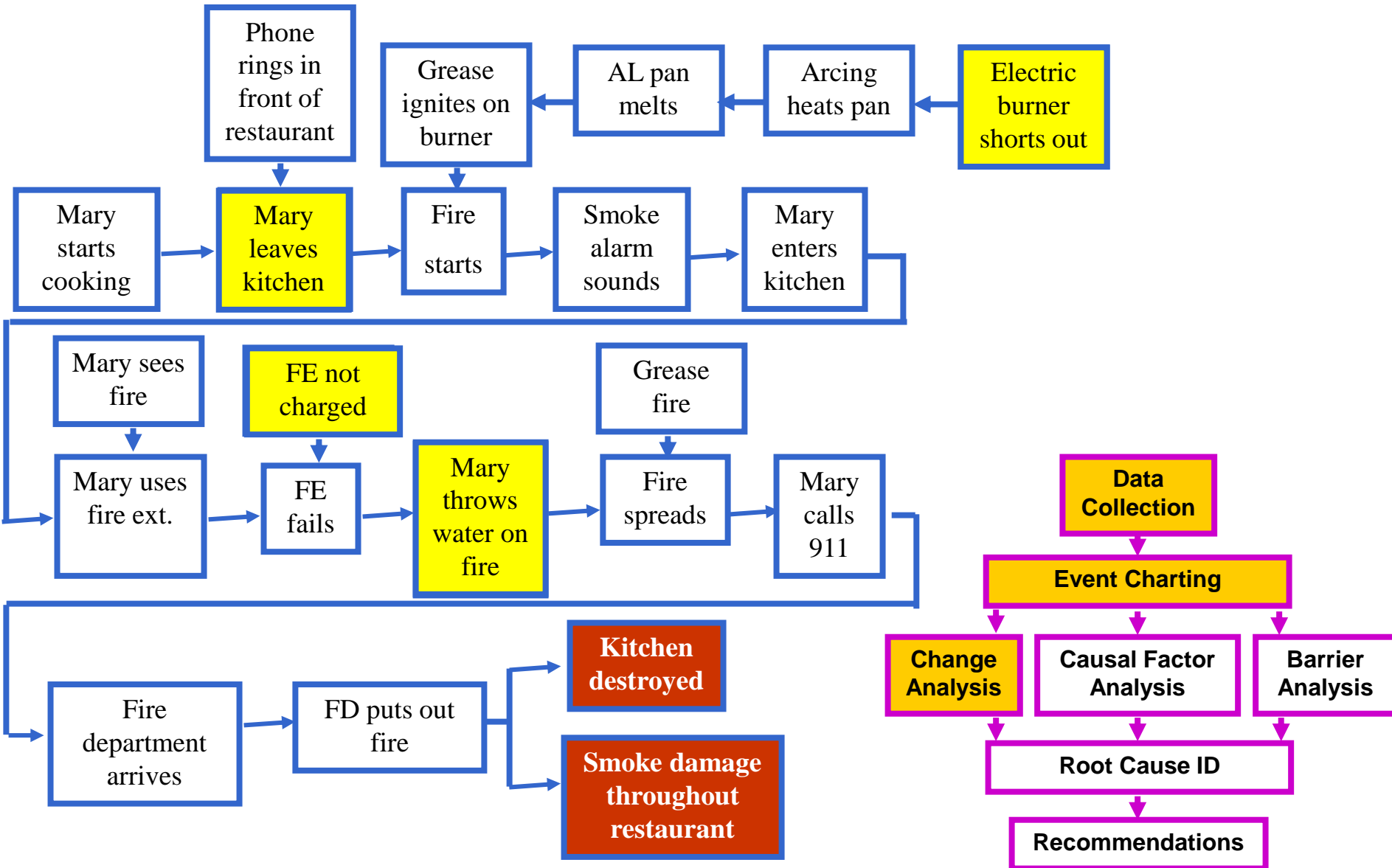
Common Changes and Differences:

- Personnel
- Plant
- Hardware
- Procedures
- Managerial Controls



Root Cause Analysis

Change Analysis



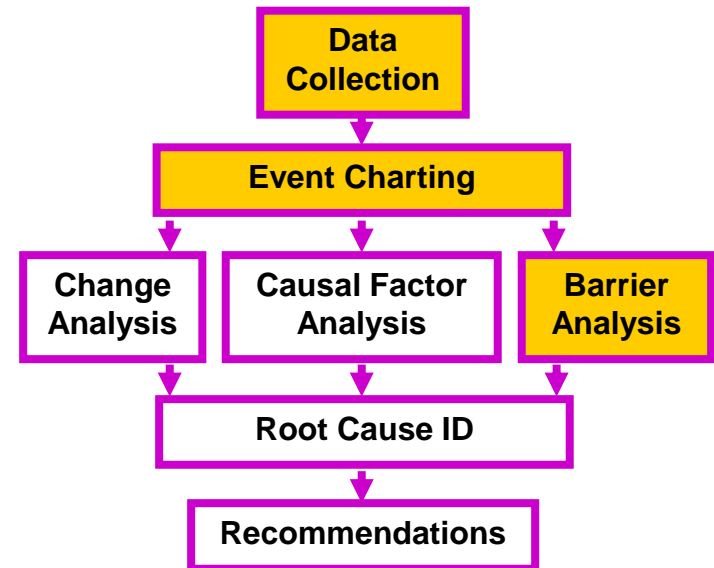
Root Cause Analysis

Barrier Analysis

Basic premise is that there is a flow of energy associated with all accidents

- Kinetic
- Potential
- Electric
- Thermal
- Steam
- Pressure

Barriers are placed to reduce the energy from people, property, environment.

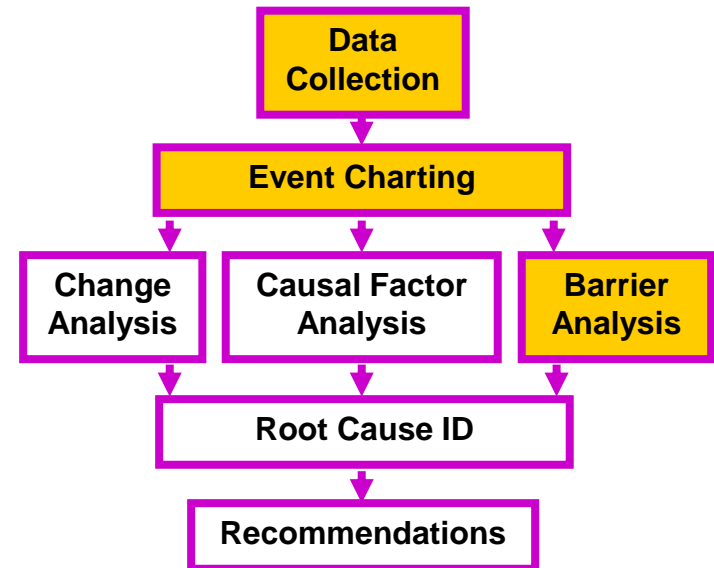


Root Cause Analysis

Barrier Analysis

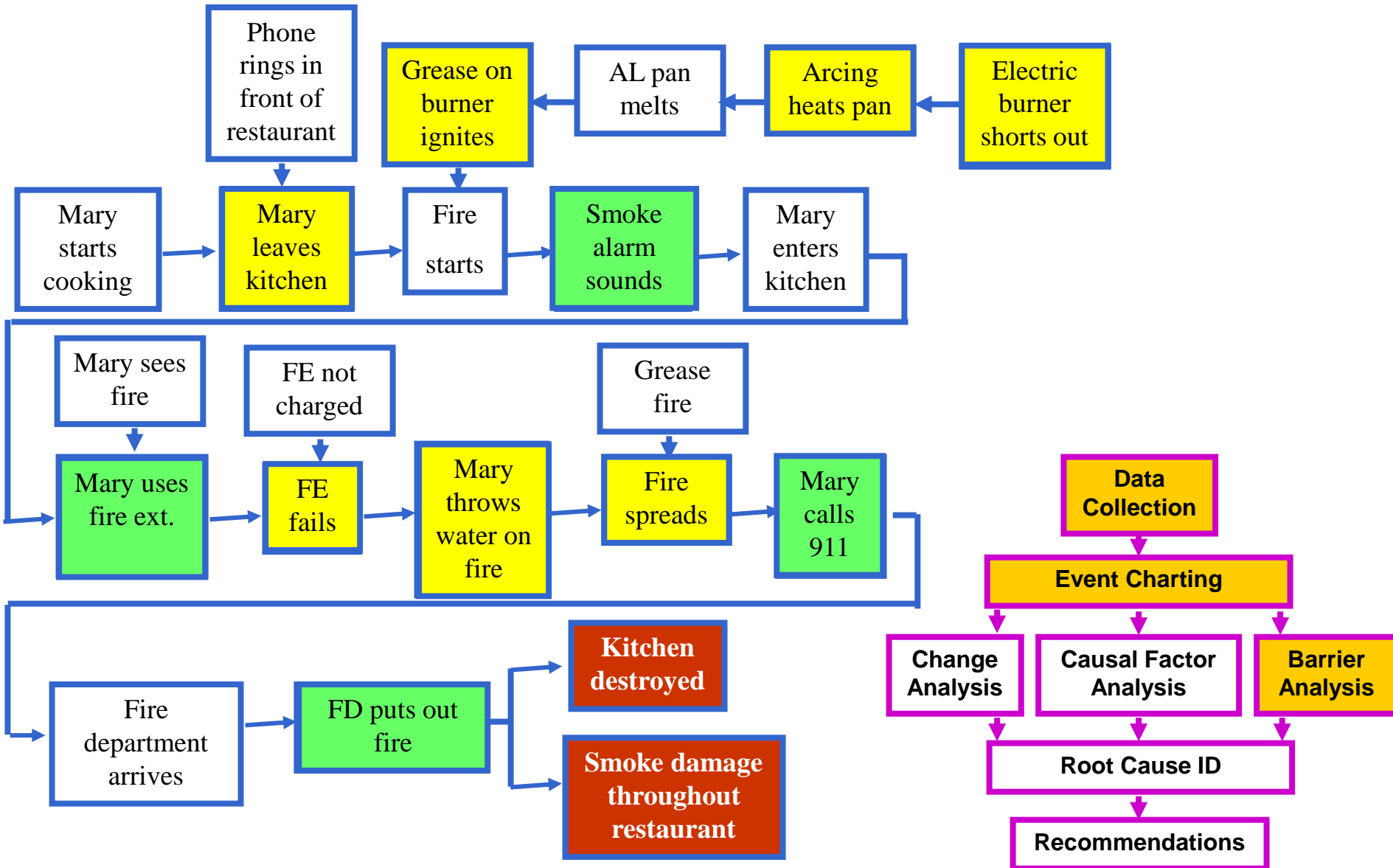
Barrier Categories:

- Equipment
- Design
- Administration (procedures processes)
- Supervisory/Management
- Warning Devices
- Knowledge and Skills



Root Cause Analysis

Barrier Analysis

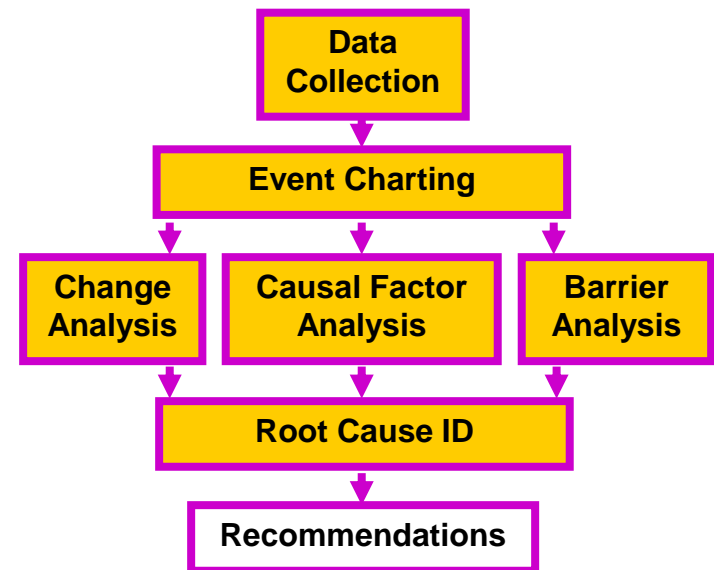


Root Cause Analysis

Root Cause Identification

Root causes

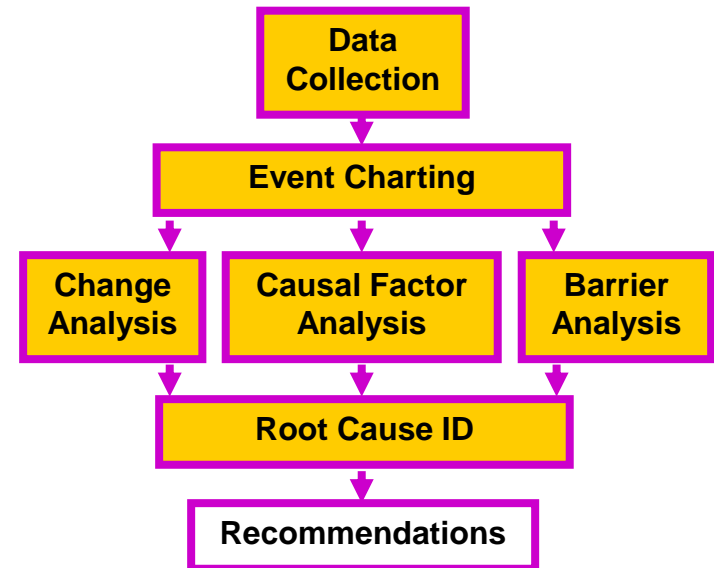
- Derived from the facts and analysis conducted
- Should answer two questions:
 1. What happened?
 2. Why it happened?



Root Cause Analysis

Root Cause Identification

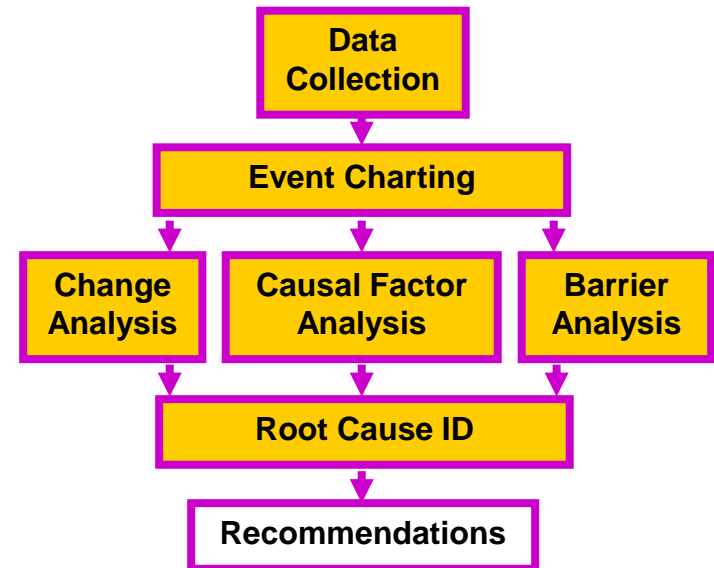
- Root causes should identify reasons for each casual factor identified by the analysis.
- Root causes which can not be completely supported by fact should identified in the report.



Root Cause Analysis

Root Cause Identification

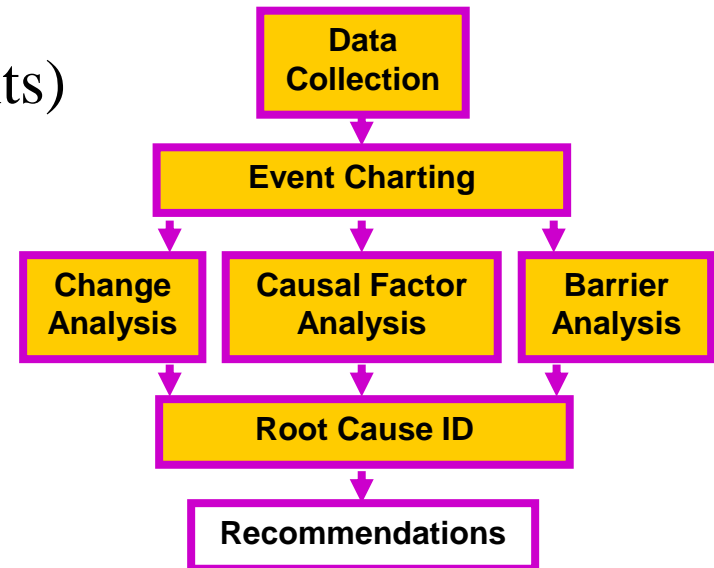
- Unattended stove
 - Facility design less than adequate
 - Lack of operational policy
- Heating element failure
 - Lack of preventative maintenance program
 - Facility design less than adequate (auto-suppression system)



Root Cause Analysis

Root Cause Identification

- Fire Extinguisher failure
 - Inadequate inspection program
- Water on grease fire
 - Inadequate training (abnormal events)



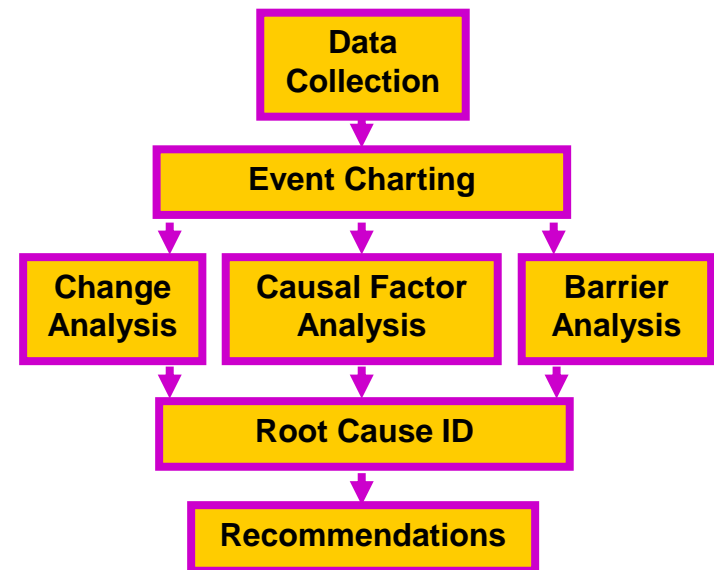
Root Cause Analysis

Recommendations

Identify the corrective actions for each cause.

Ensure the corrective action is viable by answering:

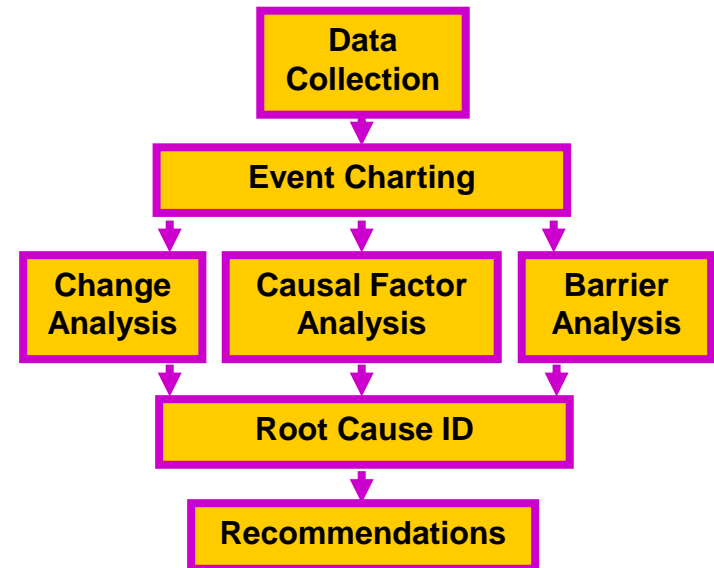
- Will the corrective action prevent recurrence?
- Is the corrective action feasible?
- Does the corrective action introduce new hazards/risks?



Root Cause Analysis

Recommendations

- What are the consequences of not implementing the recommendations?
- What time frame is adequate to implement the recommendations?
- Is the implementation of the recommendations measurable?



Root Cause Analysis

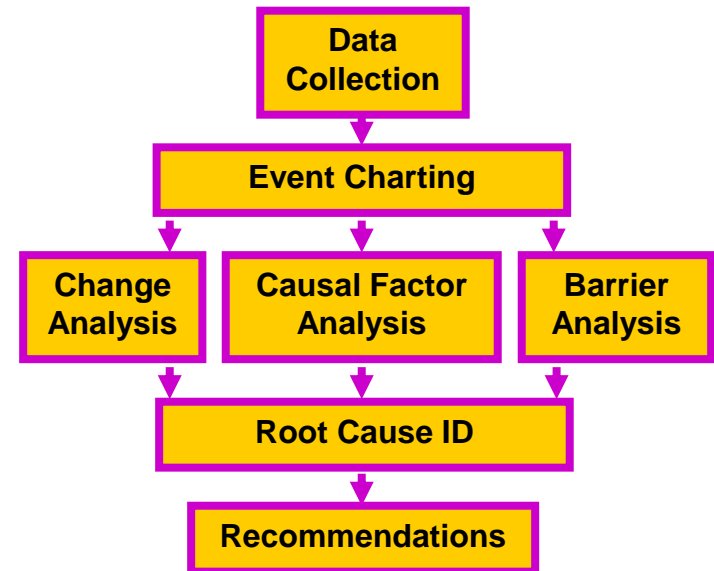
Recommendations - Direct/Contributing Cause #1

- Unattended stove

RC #1: Facility design less than adequate

RC #2: Lack of operation policy

- Install phone in kitchen
- Implement policy that hot oil is never left unattended (any other operations?)
- Modify procedure development process to identify and address potential emergencies and hazards (JSA).



Root Cause Analysis

Recommendations - Direct/Contributing Cause #2

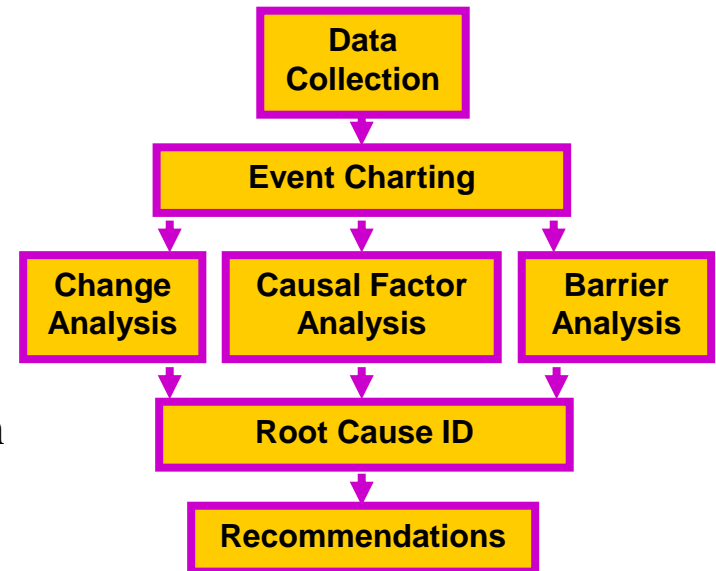
- Heating element failure

RC #3: Lack of preventative maintenance program

- Develop preventative maintenance strategy to periodically replace burner elements.

RC #4: Facility design less than adequate (auto-suppression system)

- Consider alternative preparation methods (baking) or alternative equipment (gas stove). Consider additional hazards these may introduce.
- Install commercial kitchen fire suppression system per building code.



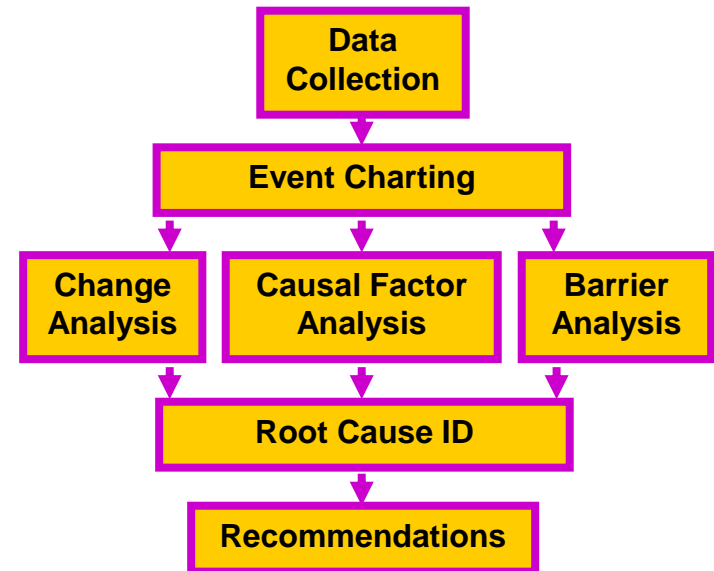
Root Cause Analysis

Recommendations - Direct/Contributing Cause #3

- Fire Extinguisher failure

RC #5: Inadequate inspection program

- Refill/replace extinguisher.
- Inspect all extinguishers monthly/annually.
- Report incidences using extinguishers to owner to trigger refilling (training).



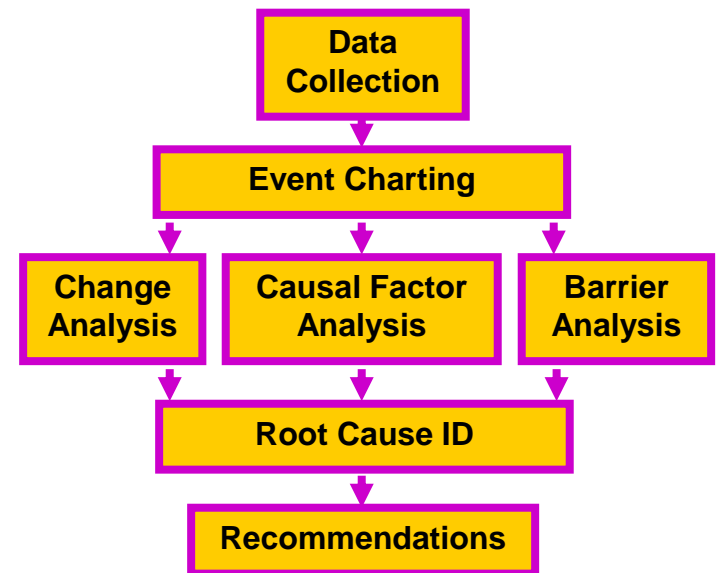
Root Cause Analysis

Recommendations - Direct/Contributing Cause #4

- Water on grease fire

RC #7: Inadequate training

- Review training program for adequacy (contingency plan in case of extinguisher failure).
- Provide hands-on training on fire extinguishers.
- Review other skill-based activities to ensure level of hands-on training is adequate.



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