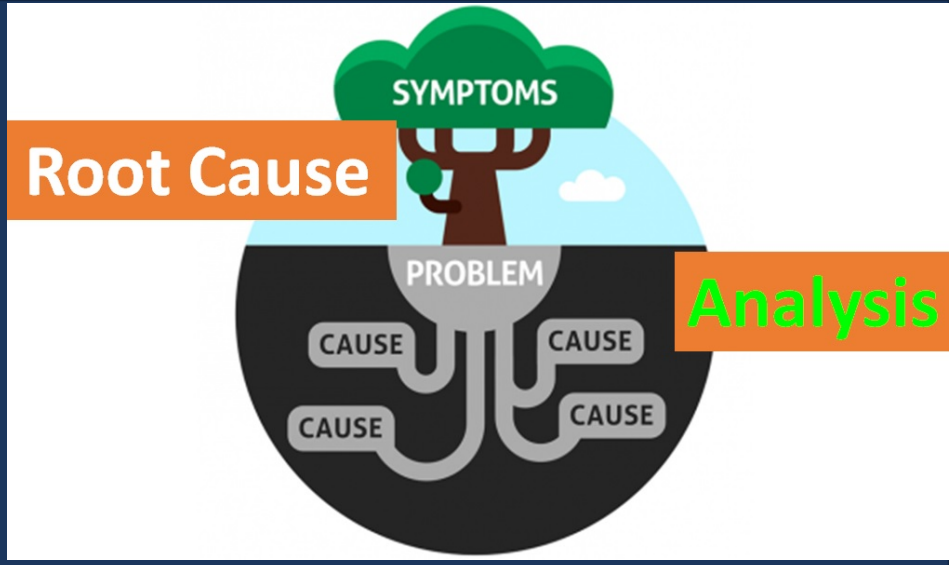
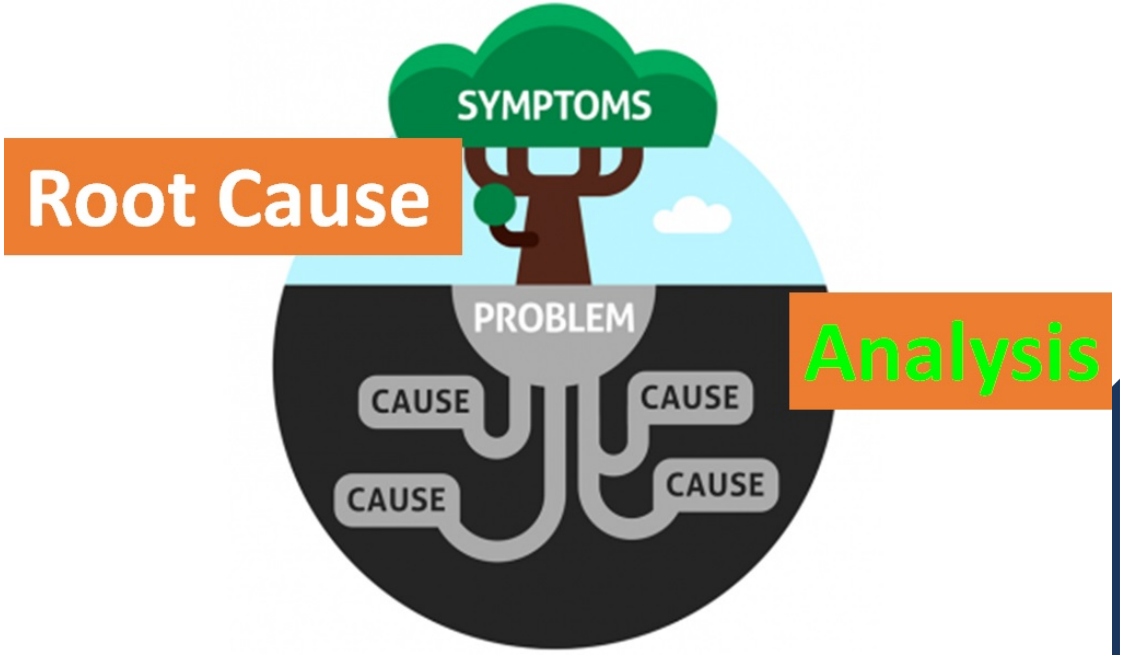
GETTING TO THE ROOT OF ROOT CAUSE ANALYSES



SAFETY SERVICES
NOVA SCOTIA

SESSION OBJECTIVES

- Understand what a root cause is
- Be able to identify a root cause
- Understand the pitfalls of finding root causes



IS THERE ANYTHING SPECIAL YOU GUYS WOULD LIKE TO LEARN?

"We've decided to name
16 new safety rules after you."

CONSIDER . . .

- A company's policy requires that all workers in the shipping area receive training before using the forklift
- A new worker comes to the warehouse and receives the training. On his third day, the forklift overturns while he was driving. The driver admits he was going too fast.

- What caused the incident?
- What would be your next steps?

FORKLIFT INCIDENT CAUSES

- Driver was going too fast
- But how many considered
  - In what exactly was he trained? How was the success of the training verified?
  - What supervision was being exercised?
    - What level of supervision was expected by upper management?
  - Was the forklift in proper operating condition?
  - Why was a forklift speed limiter not installed?
  - What cultural, psychological, personal issues may have played a part? Pressure to produce/work fast? Fatigue?
  - Other drivers' situations?

NEXT STEPS?

- Training

NEXT STEPS?

- Training???
- Other drivers (broader view)
- Speed limiter
- Work pressures
- Macho culture
- Tired
- Expectations

TYPES OF CAUSES OF INCIDENTS

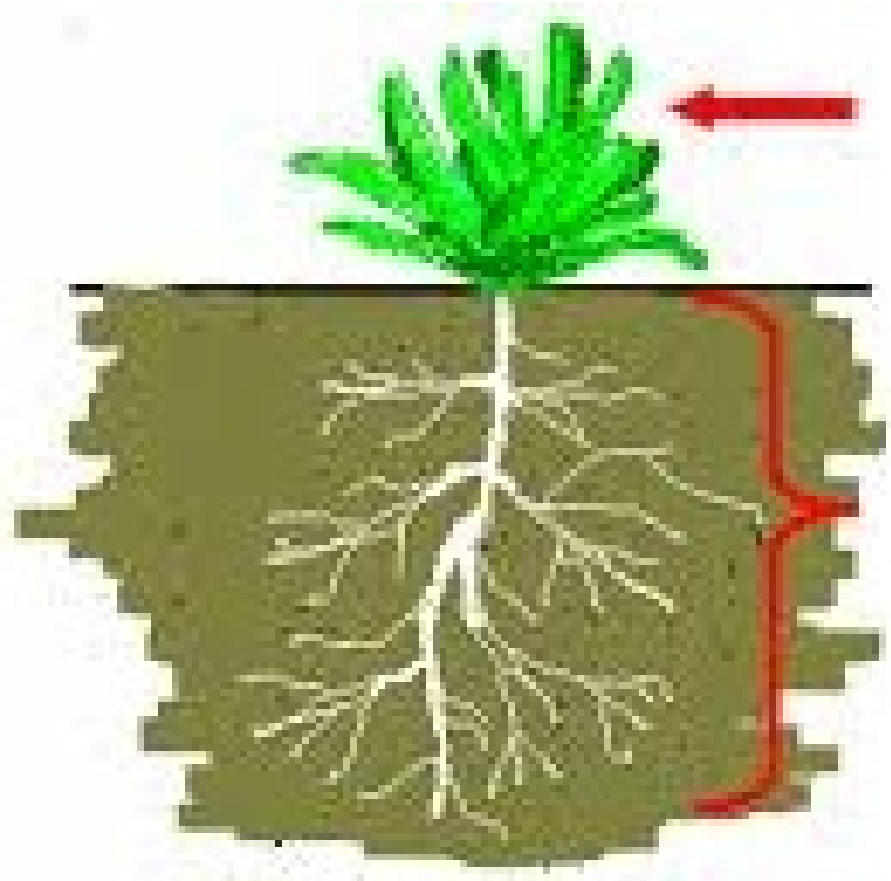
- Proximate or Immediate Cause
  - Substandard acts or conditions that lead ***directly*** to an incident
  - Also called “causal factor”
  - The forklift driver was going too fast
- Contributing Cause
  - A factor that results in the emergence of the proximate cause, but is NOT the underlying cause

TYPES OF CAUSES OF INCIDENTS

- Underlying or root causes
  - Initiating cause of either a condition or a causal chain that leads to an outcome or effect of interest
  - The conditions that enable one or more proximate/immediate causes

  - Often are inadequacies in the occupational safety and health management system that allow the immediate causes to arise, leading to incidents

ROOT CAUSE



- Immediate cause
  - Symptom of the problem
  - The “weed” above the surface (obvious)
- The underlying causes
  - The “root” hidden below the surface

GOAL OF ROOT CAUSE ANALYSIS?

- A root cause is a factor that, when you fix it, makes the problem go away and never come back in any form
  - And fix other problems you did not realize were there!

- *Entirely preventing* problem recurrence
- "Success" is defined as the near-certain prevention of recurrence

- The best investigators should always focus on root causes: the ones that enable the others to happen

HURRICANE KATRINA (2005)

- Largest, 3rd strongest hurricane ever recorded to make landfall in US
- Levees were designed for Category 3 hurricane
  - Katrina was Category 5 hurricane
- Death toll was at 1,836
  - Several died of starvation
- Storm surge from Katrina was 20-ft (six meters) high
- Affected over 15 million people
- $81 billion in damages, but the total economic impact may exceed $150 billion

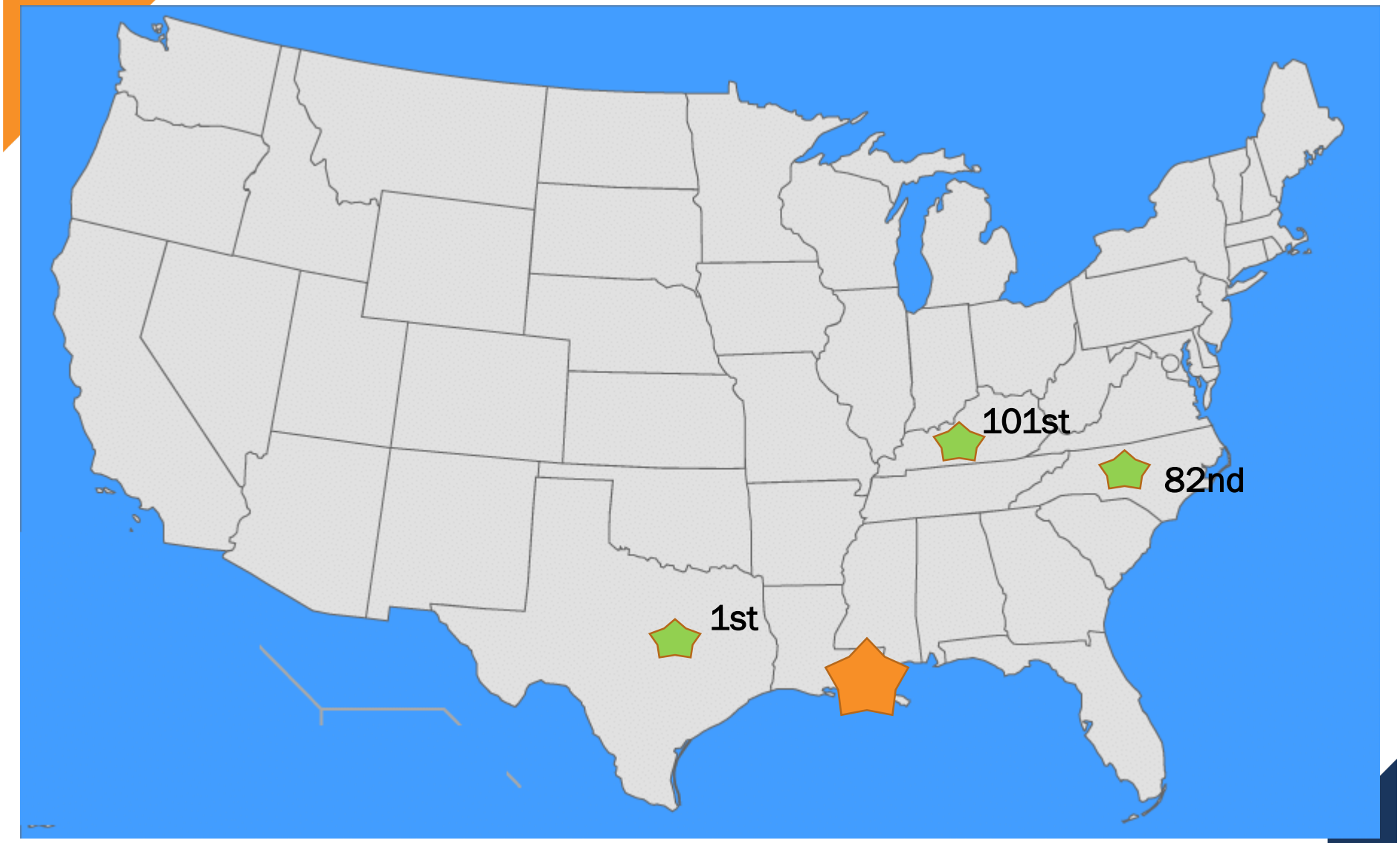
HURRICANE KATRINA

- Katrina was not the first Category 5 hurricane to hit the US
- What would you say were the causes of the severe damage from Katrina?

  What corrective actions would you suggest?

IDENTIFY CAUSES OF INCREASED DAMAGE

- Inexperienced staff at FEMA


101st
82nd
1st

IDENTIFY CAUSES OF INCREASED DAMAGE

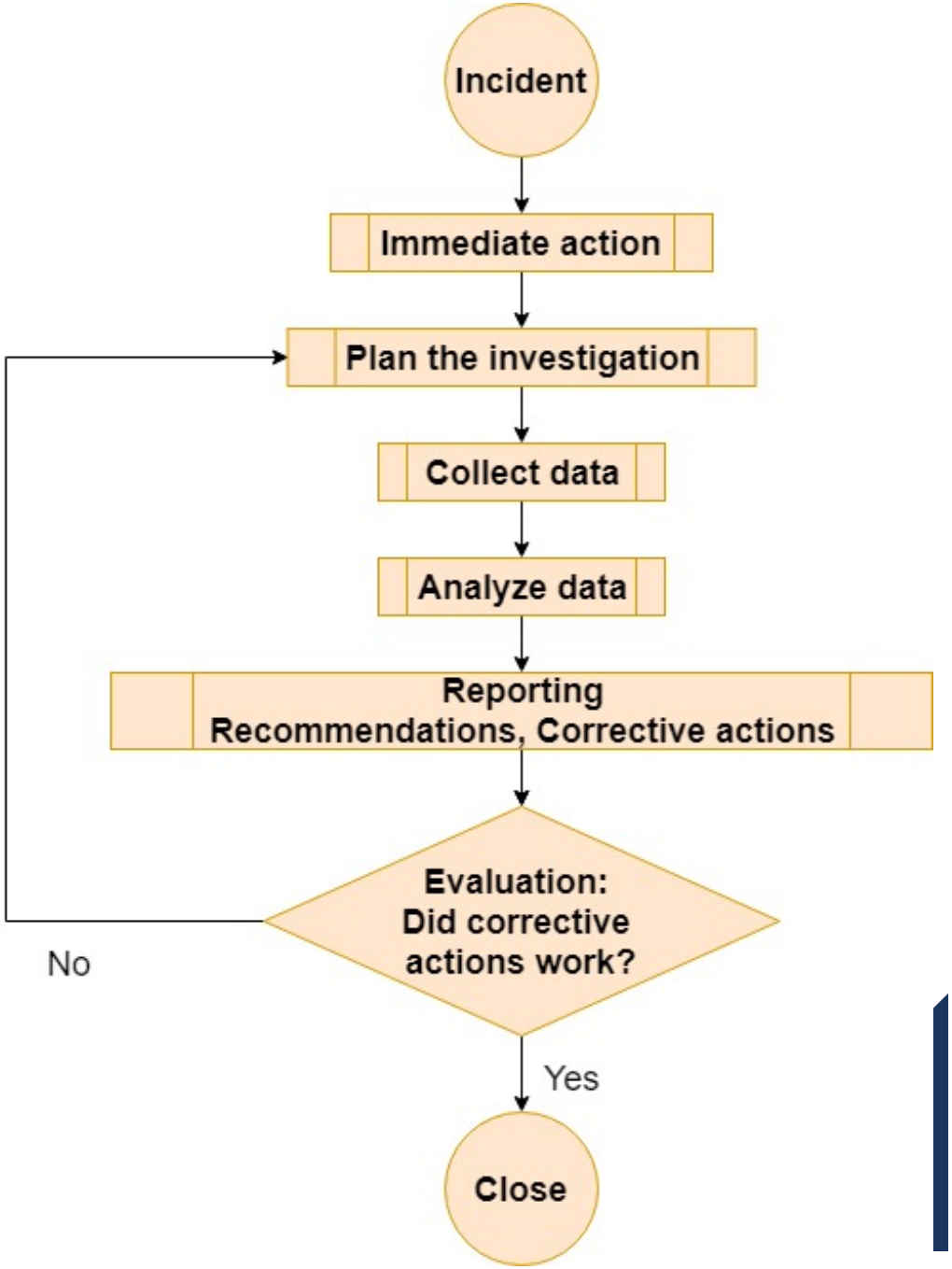
- Inexperienced staff at FEMA
- Funding had to be approved annually for decades
  - The levees were only ever designed for Category 3
  - The levees were never completed
- No effective emergency plan
  - No orderly evacuation
  - Emergency shelters did not have enough supplies

HURRICANE KATRINA CORRECTIVE ACTIONS

- Remove public safety operational positions (i.e. FEMA head) from the political appointment process
- Allow multi-year funding for public safety projects
- Require cities to have approved emergency plans
- Require urban and highway designers to plan for evacuations

- No where here did I say “Build higher levees”

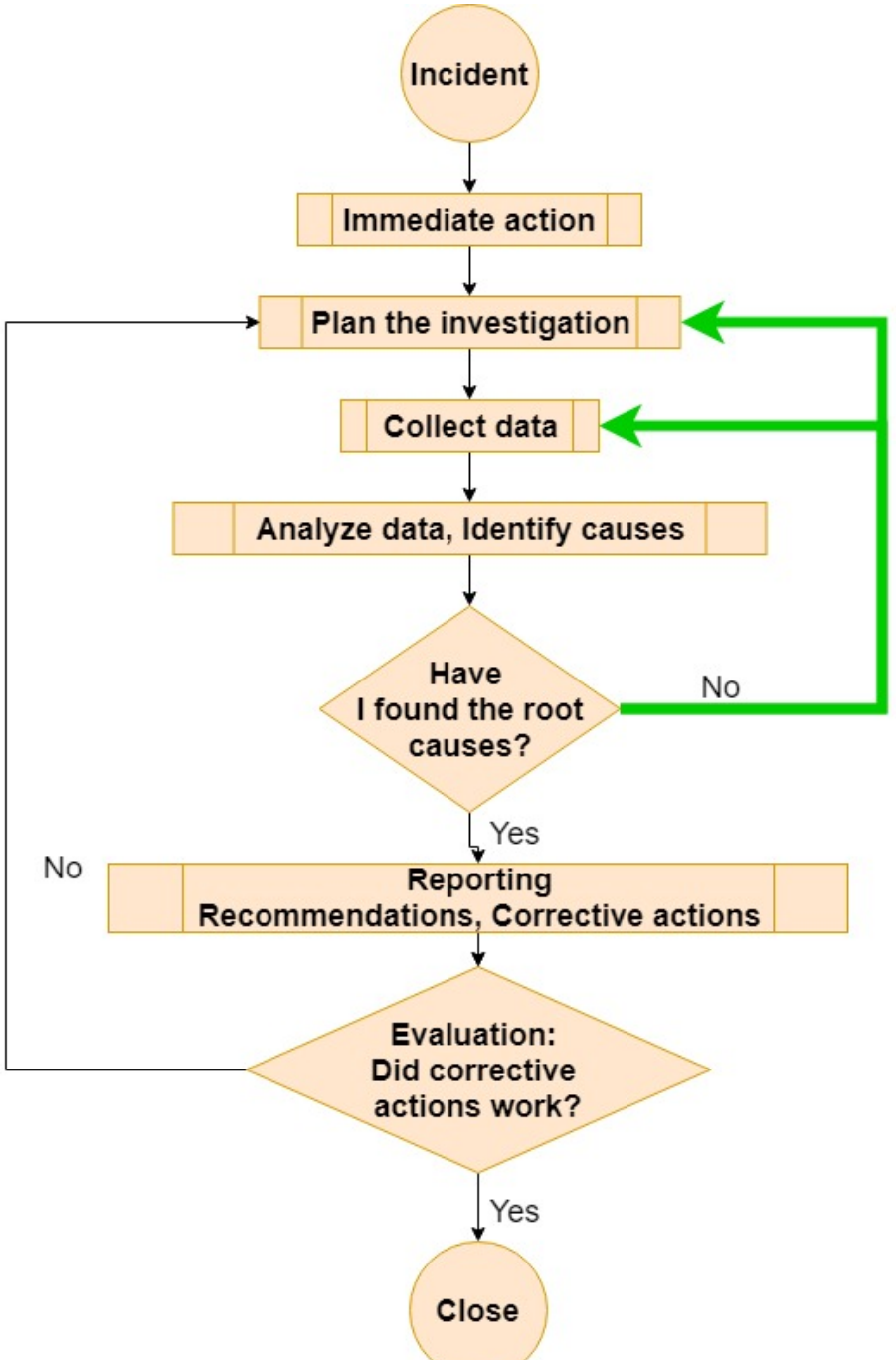
STEPS IN INCIDENT INVESTIGATIONS



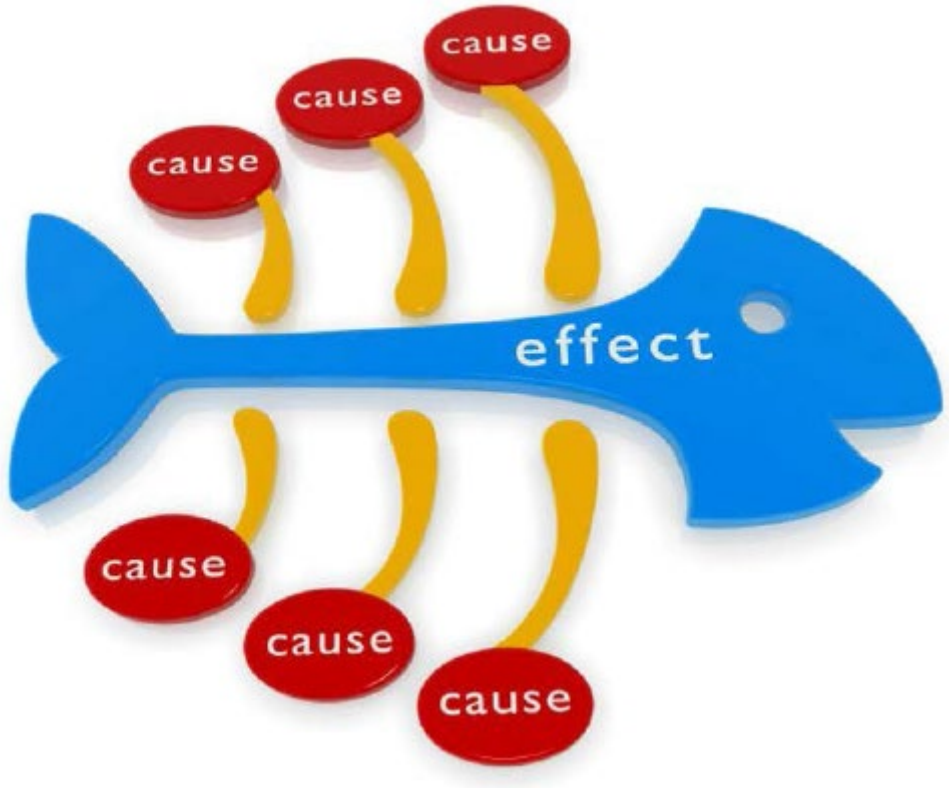
INCIDENT INVESTIGATION STEPS

- Root cause analysis is an iterative procedure
  - Define issue (gather facts of incident)
    - Avoid defining the issue in terms of a possible solution, e.g. inspection procedures are not sufficient
  - Identify proximate causes
  - Consider contributing and root causes
  - Gather more information to support, refute contributing and root causes
  - When you have confirmed the root causes, finalize the investigation
- A persistent inquiry process is absolutely necessary.

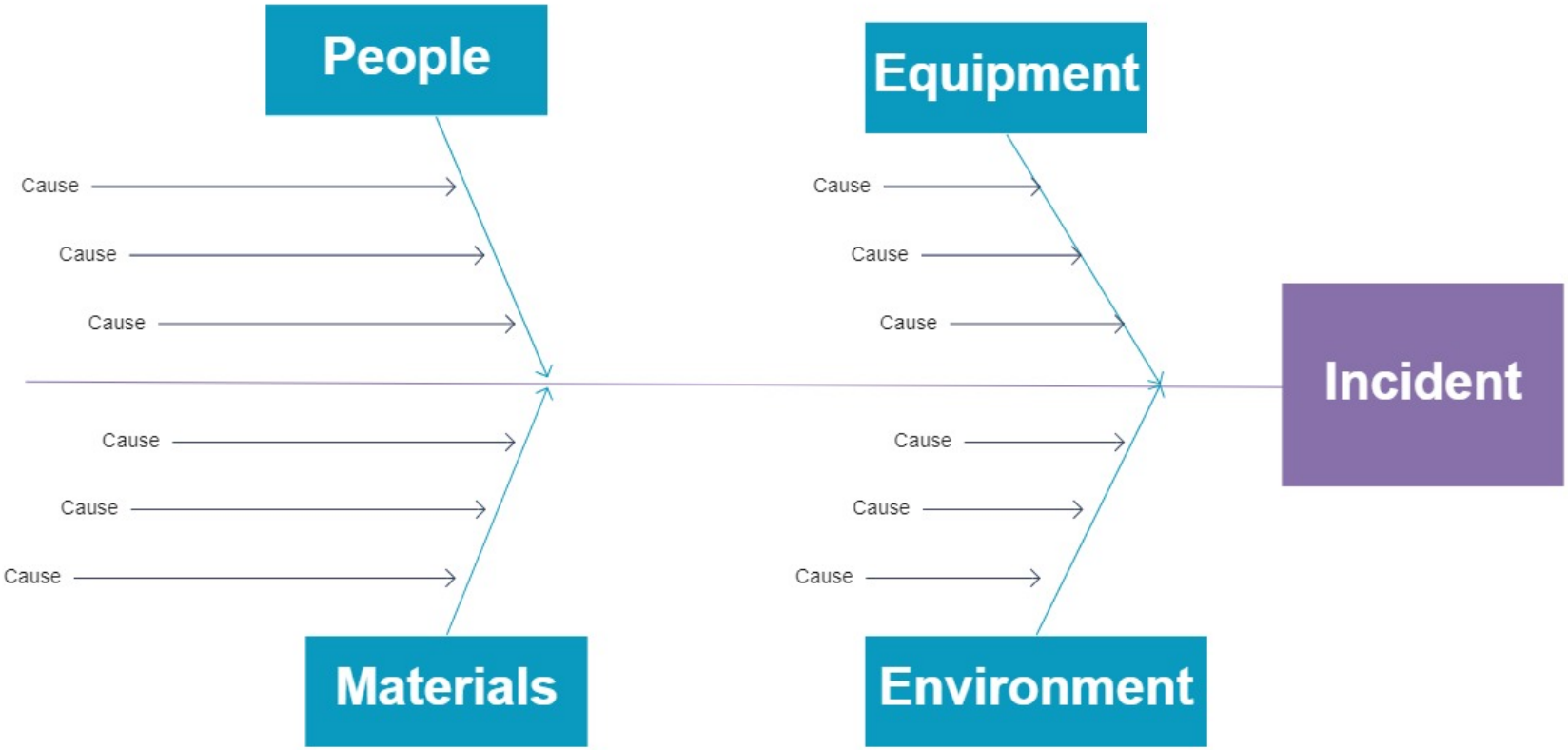
INCIDENT INVESTIGATION STEPS – ROOT CAUSE VERSION



IDENTIFYING PROXIMATE CAUSES



BASIC FISHBONE DIAGRAM

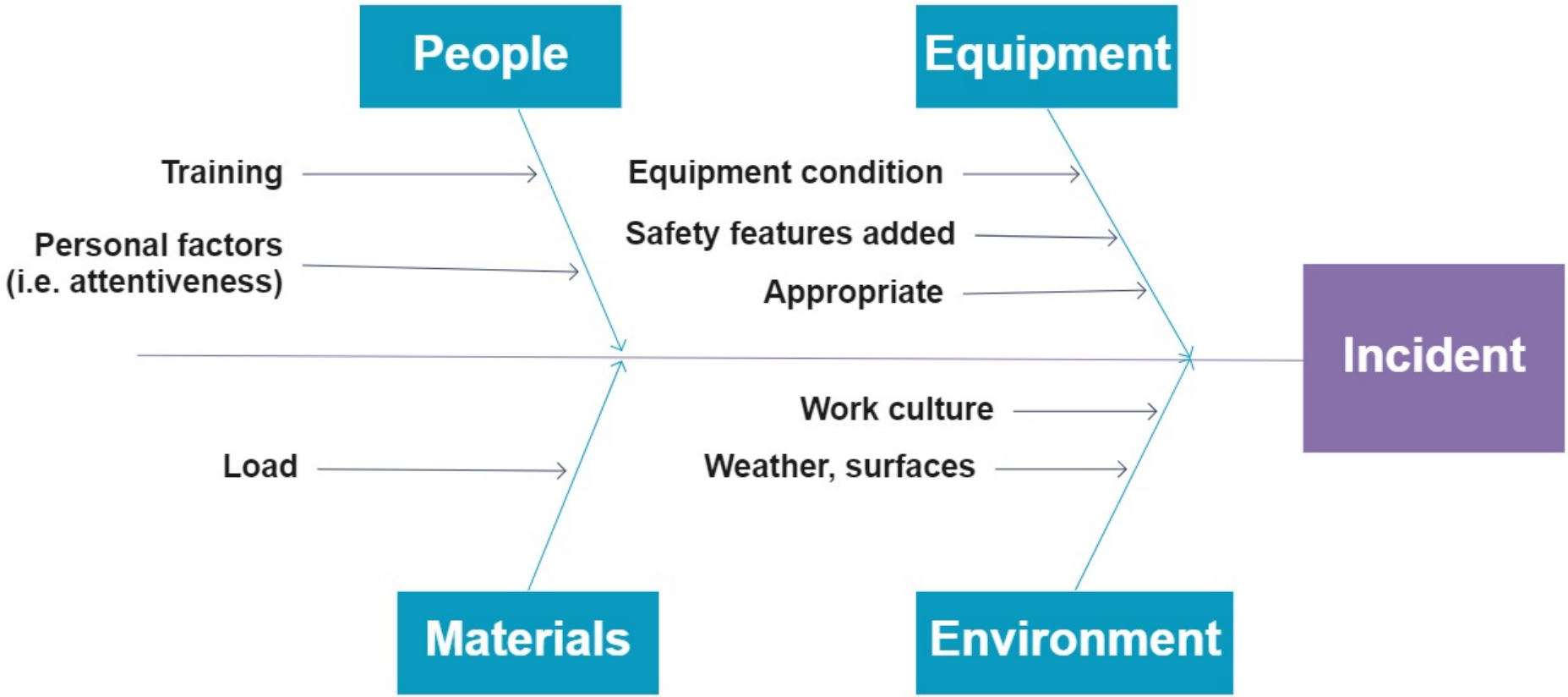


CAN USE OTHER “BONES”

- People/equipment/materials/environment
- Man/machine/method/milieu
- Policies/procedures/people/plant

- Use diagrams to generate ideas

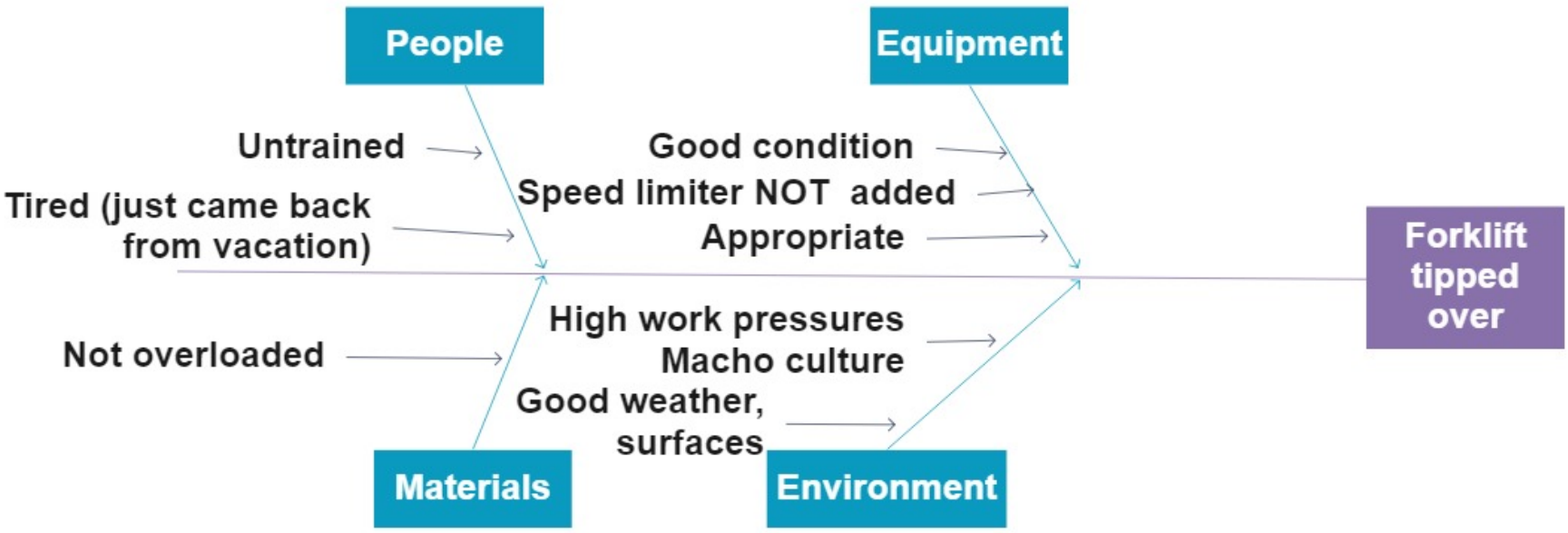
FISHBONE DIAGRAM



USE CHECKLISTS

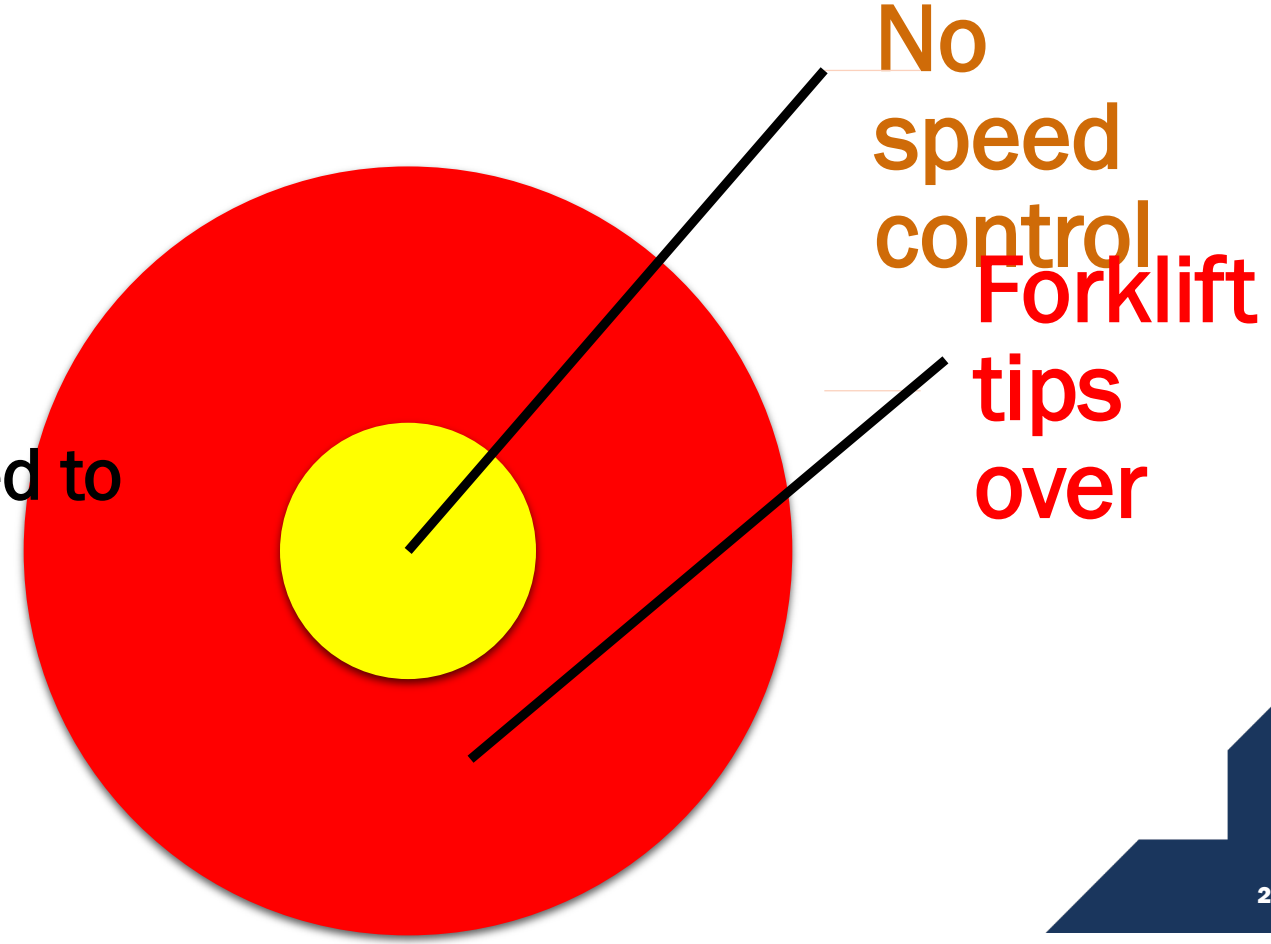
- Develop checklists to fill out the bones
- Methods
  - Were the workers trained properly in the procedure?
  - Are the work instructions clearly written?
  - Are the work instructions complete?
  - Was the process changed?
  - Was the design changed?
- Machines
  - Was the correct tool used?
  - Was the tooling used within its capabilities and limitations?
  - Is the equipment being properly maintained (i.e., daily/weekly/monthly preventative maintenance schedule)
  - Does the machine have an adequate guard?

FORKLIFT FISHBONE DIAGRAM



NOW WHAT?

- The Fishbone gives us the “What happened”
  - The immediate causes
- But for the root causes, we need to dig deeper



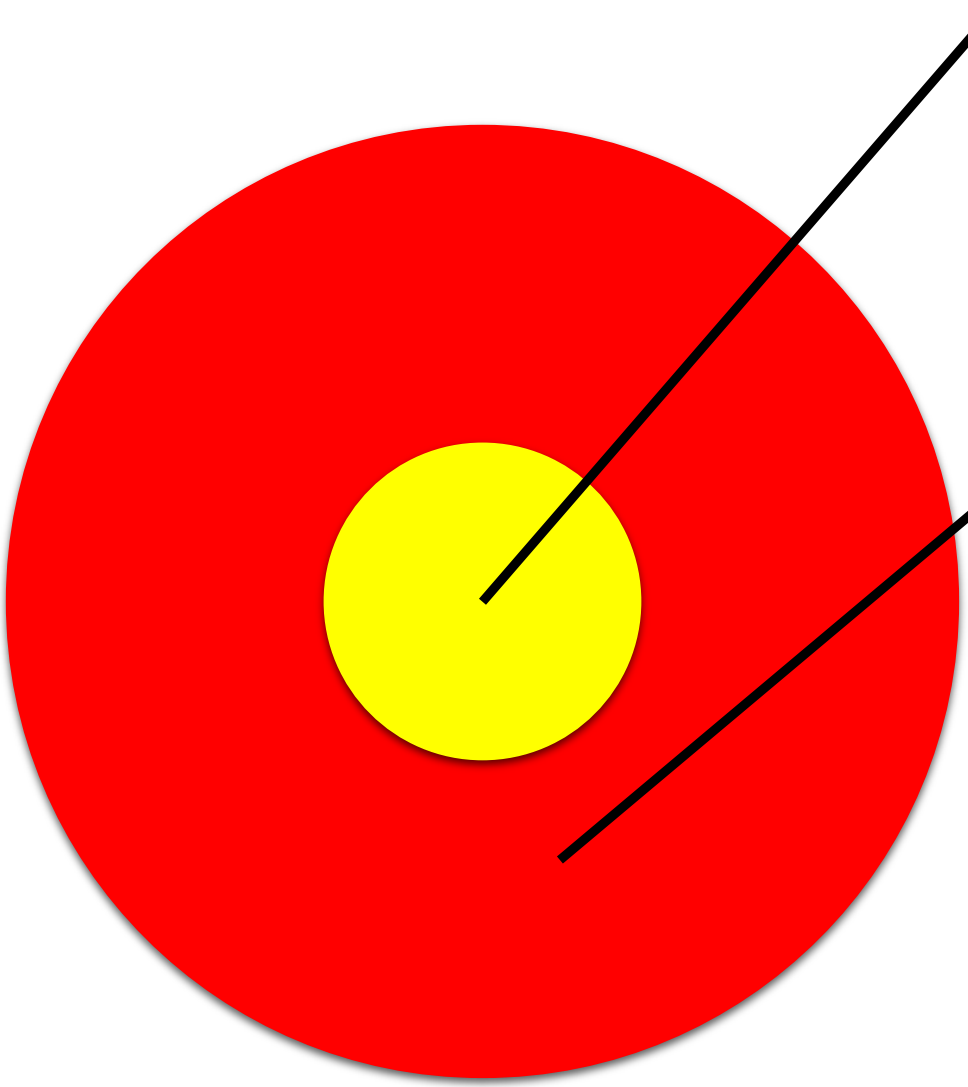
5-WHY'S

- Having filled out the fishbone diagram and identified some contributing causes, ask "Why" for each contributing cause

- "Why" is taken to mean "What were the factors that directly resulted in or allowed the issue to exist?"

- Keep asking "Why" until you have reached the most basic cause

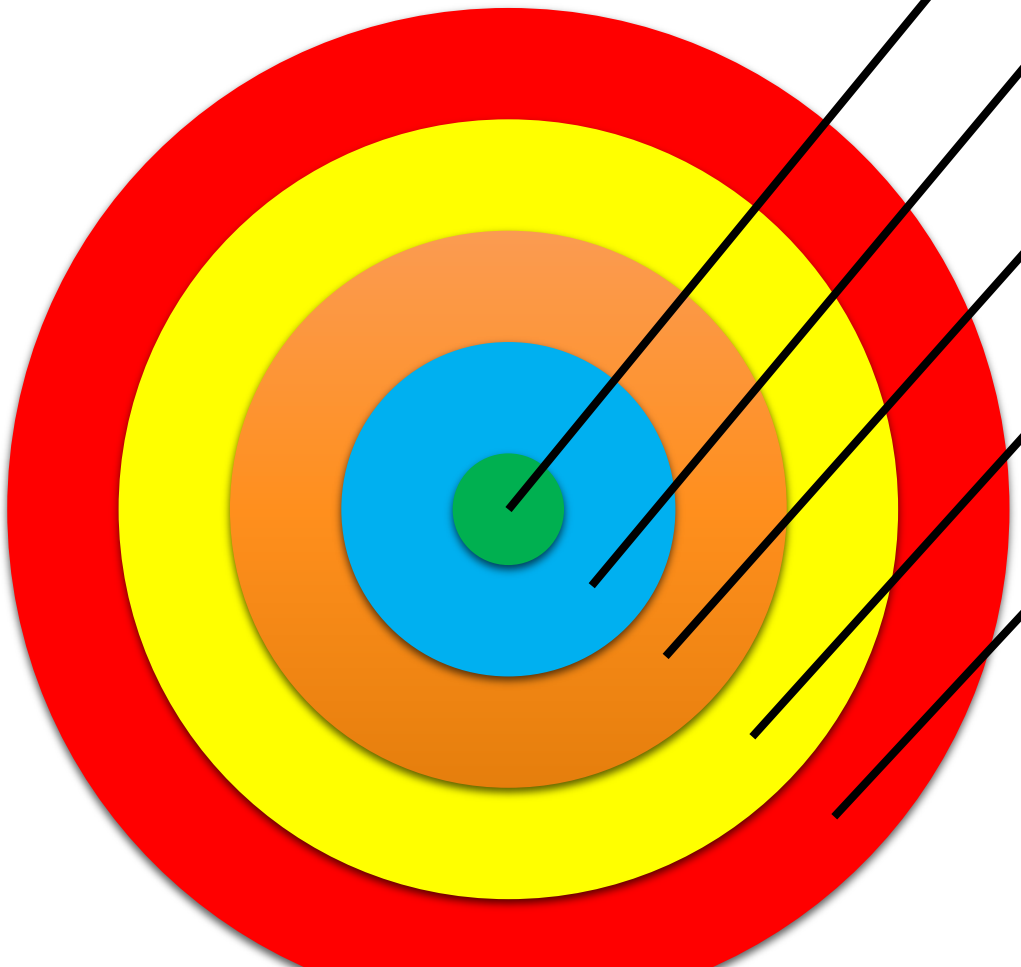
SOME WHYS?



No speed control

Forklift tips over

ROOT CAUSE EXAMPLE



Safety officer not involved in major purchase decisions

No process to evaluate the need for safety options

No one thought of a speed control

No speed control

Forklift tips over

WHEN TO STOP ROOT CAUSE ANALYSIS?

- “Root causes" are likely to have many levels, and the analysis stops when the investigator believes they have gone “deep enough”
  - When the cost to address the issues you are finding far exceeds the cost of a repeat incident
  - When the impact of the root cause is minor

BACK INJURY EXAMPLE

- After a move, several boxes of files are piled in a filing room waiting to be placed in cabinets
- When moving a box, secretary hurts her back

- What are some possible causes?

BACK INJURY EXAMPLE

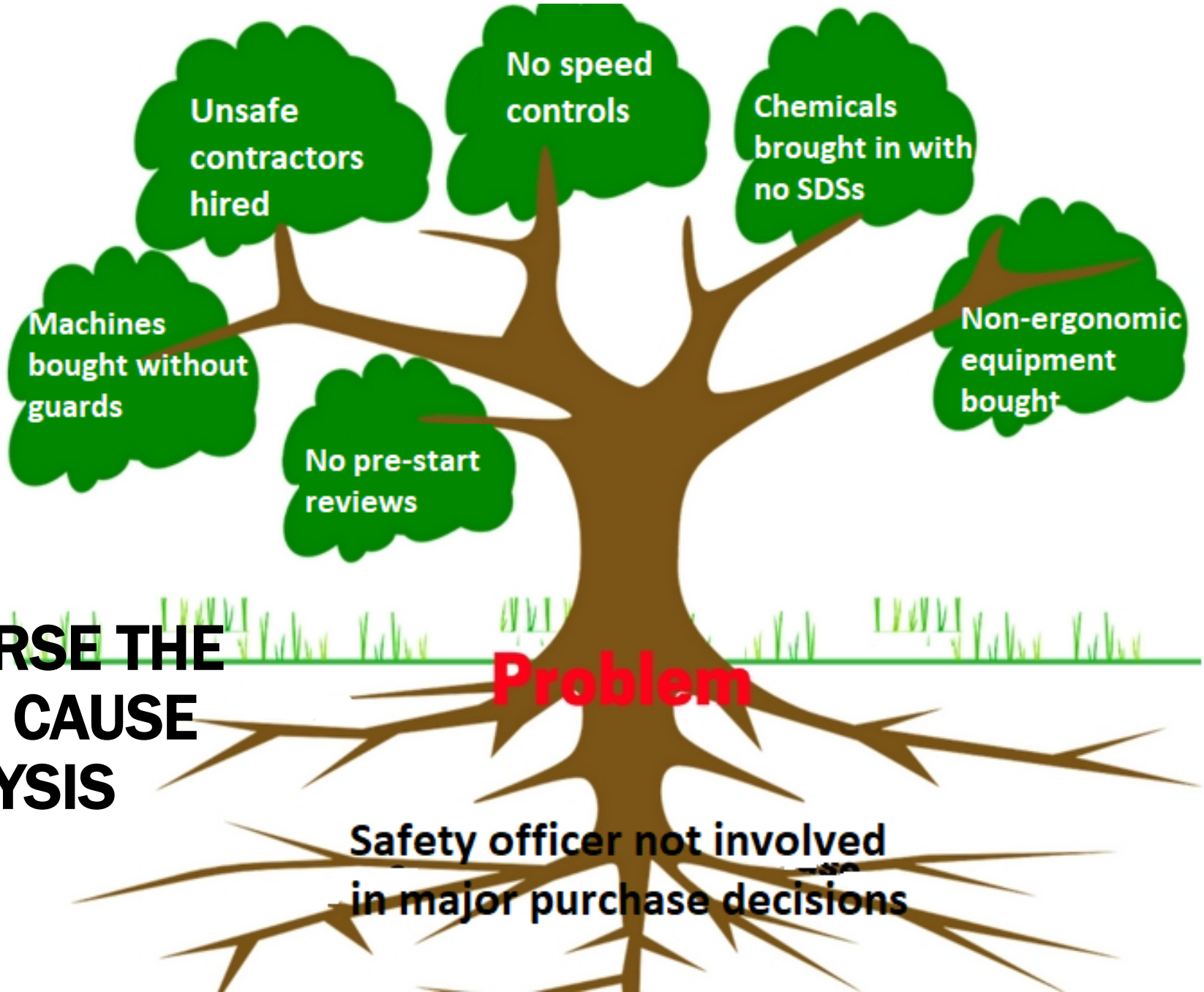
- Lifting training was not required
- Lack of senior leadership
  - Managers afraid to go over budget (hire movers)
  - Hazard assessments were never done
- Wrong equipment used (“normal” boxes, not smaller ones)
- Paper existing in the first place (no scanning process to get rid of paper)

BUT CAN'T A ROOT CAUSE AFFECT OTHER PROCESSES?

- Yes. A true root cause probably impacts several processes

- When evaluating importance of a root cause, consider a "Reverse Tree Diagram"
- Start with one root cause as a "root". Identify how many aspects of your organization a weakness in that root may affect

REVERSE THE ROOT CAUSE ANALYSIS



EXERCISE

- Thinking of the back injury, what would you do with the various “root causes”?
  - Lifting training was not required
  - Lack of senior leadership
  - Wrong equipment used
  - Paper existing in the first place
- Considering the issue you are facing: back injuries amongst office staff (a relatively rare event)
  - So how many resources does the issue justify?

EXERCISE REVIEW

- Relatively easy, cheap to implement (go ahead)
  - Add lifting to training curriculum
  - Improve manager training in hazard assessments
  - Order smaller boxes
- Complex to implement (keep in mind to see how often it comes up in other investigations)
  - Senior Management leadership
  - Digitizing records
    - But this may also have ***cost savings*** in terms of operational efficiencies!!

ISSUES WITH ROOT CAUSE ANALYSES

- RCAs are subjective, and not easily reproducible
  - Is that a problem?
- There is often more than one root cause for an event or a problem
  - The difficult part is having the persistence and sustaining the effort required to determine them

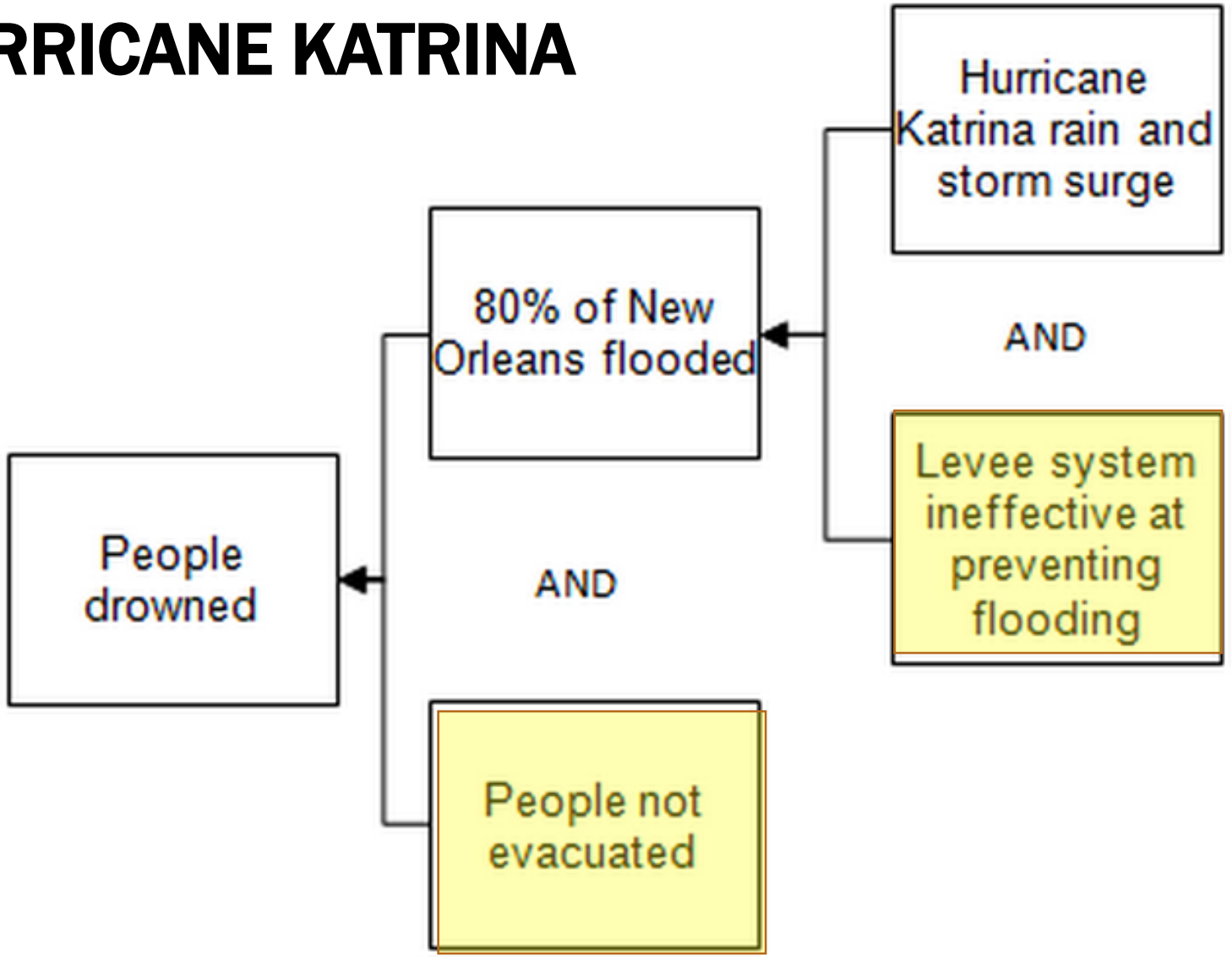
CAN'T FIX EVERYTHING!!

- Root cause analysis can highlight many issues – far more than you can realistically tackle
  - Imagine having to consider organizational and policy changes for every single incident!!

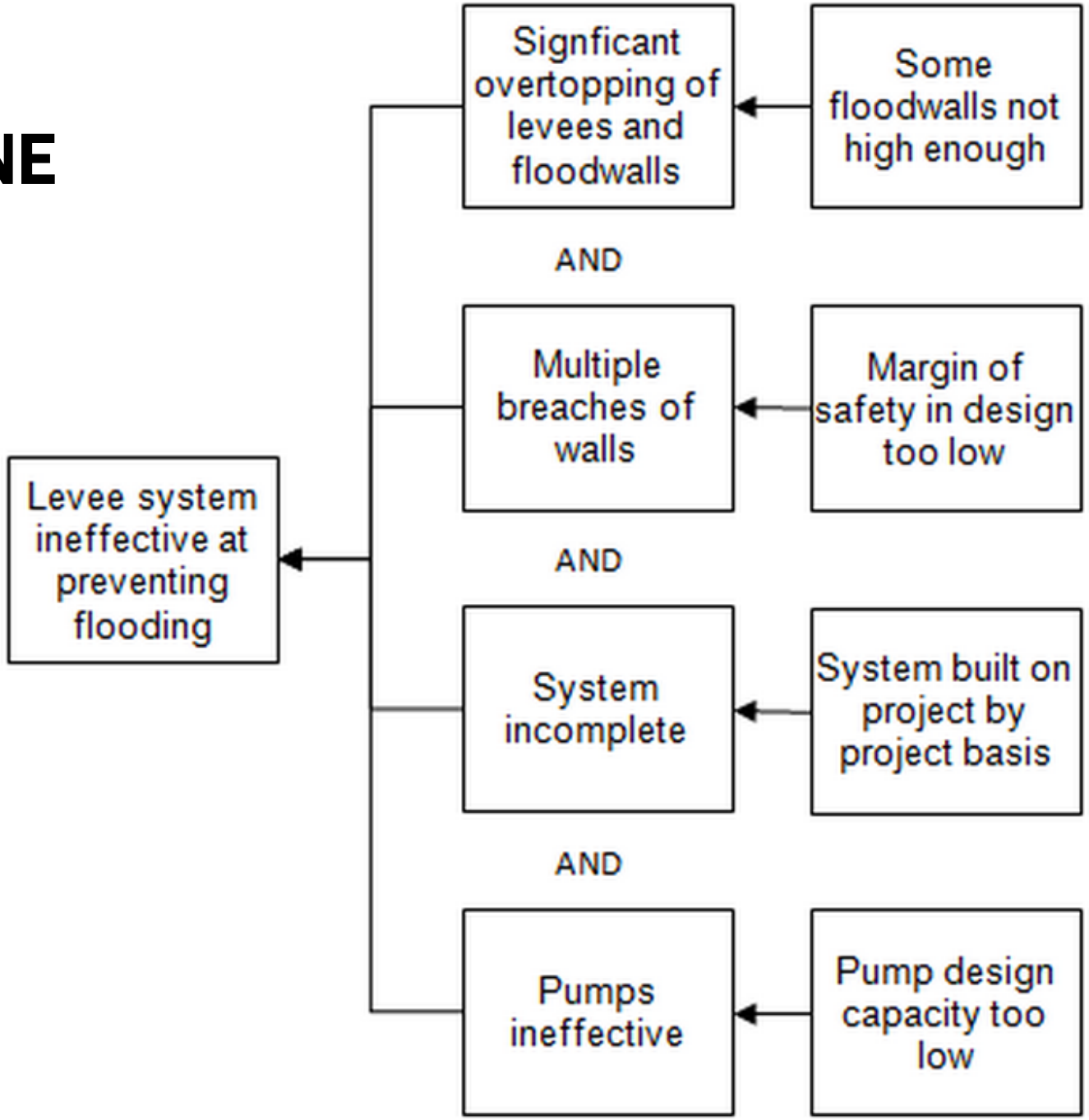
- So what do you do?
  - Reserve full-scale RCA for "major" incidents
    - Generate fewer recommendations; saves time
  - Assess the impact that fixing each cause would have on preventing recurrences
    - Fix the ones where the benefits outweigh costs


Thank You
Mahalo
Kiitos
Tack
Toda
Thanks
Grazie
Obrigado
Takk
Merci
Gracias

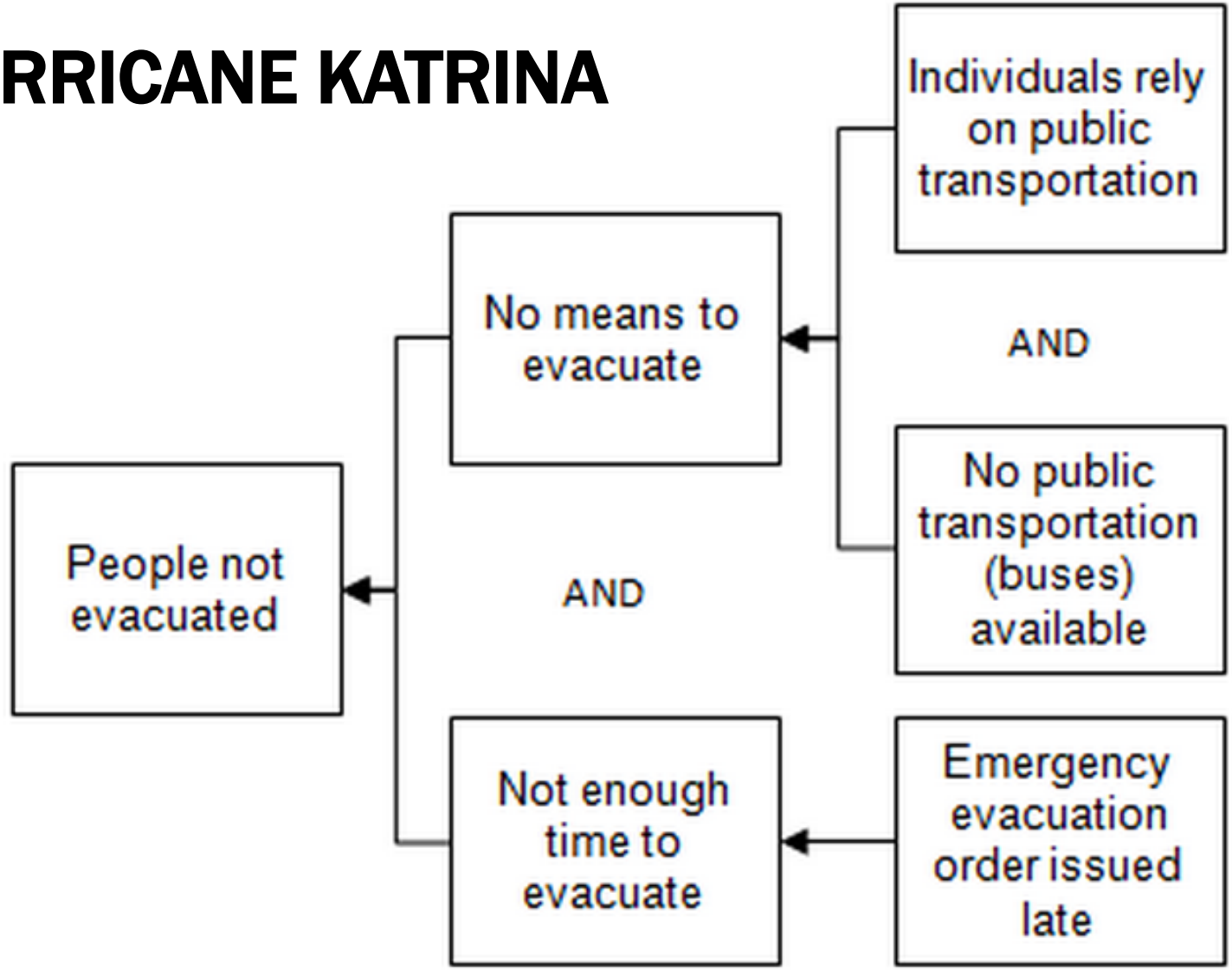
HURRICANE KATRINA



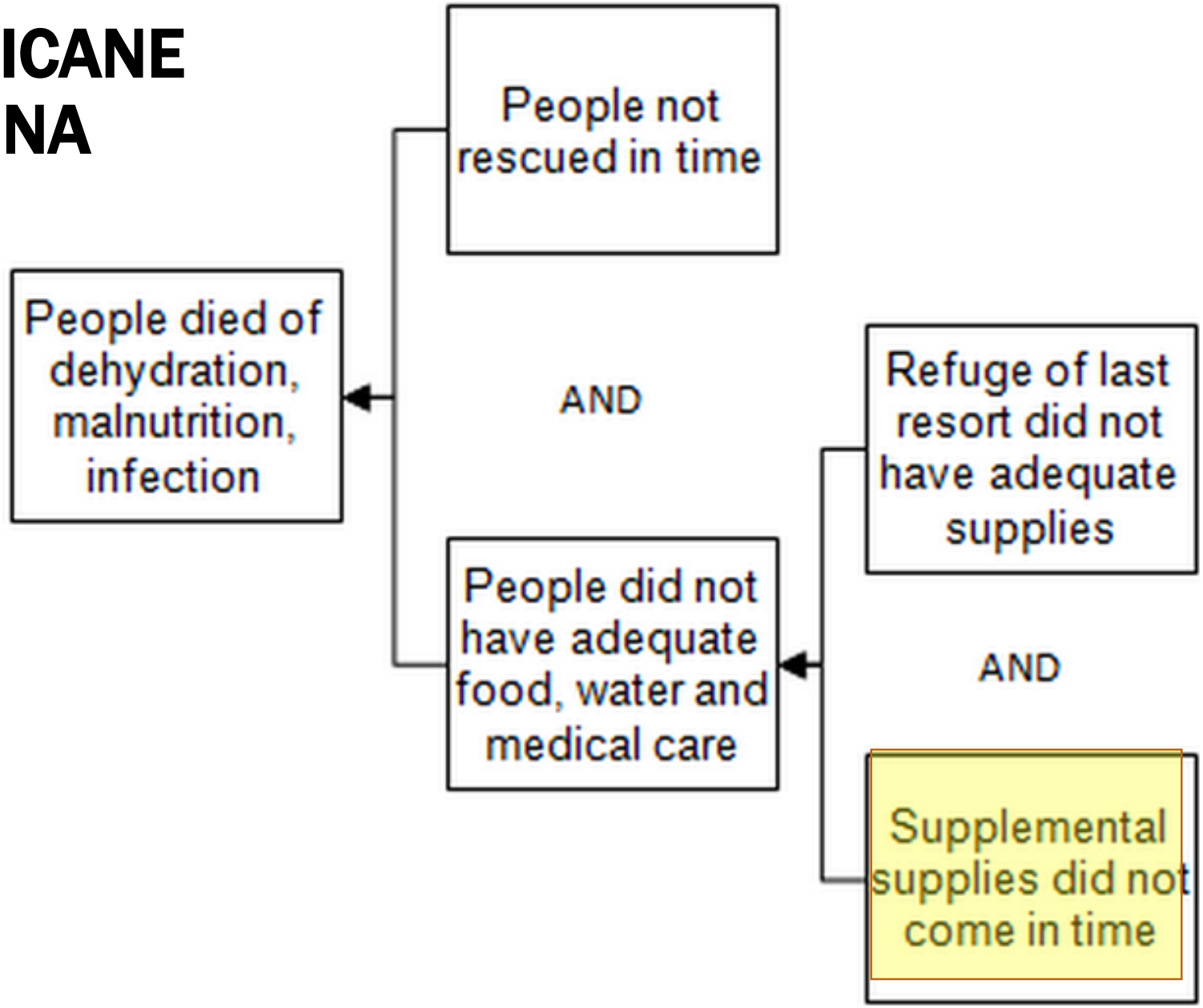
HURRICANE KATRINA



HURRICANE KATRINA



HURRICANE KATRINA



HURRICANE KATRINA