DROPS from Oilfield Services
A Case for Action

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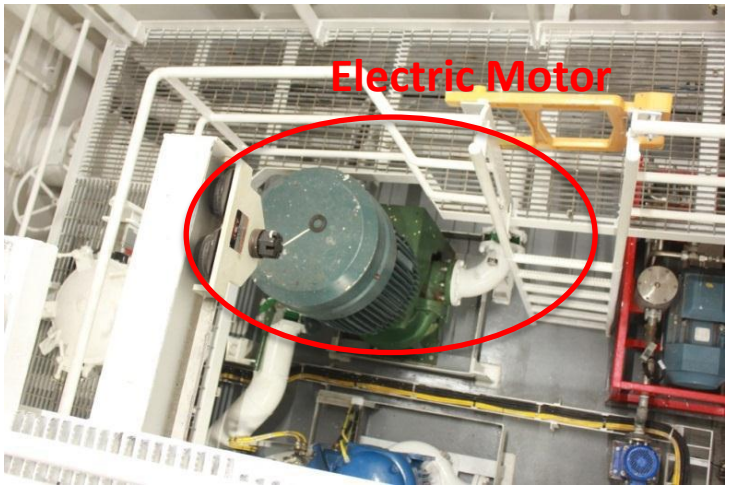
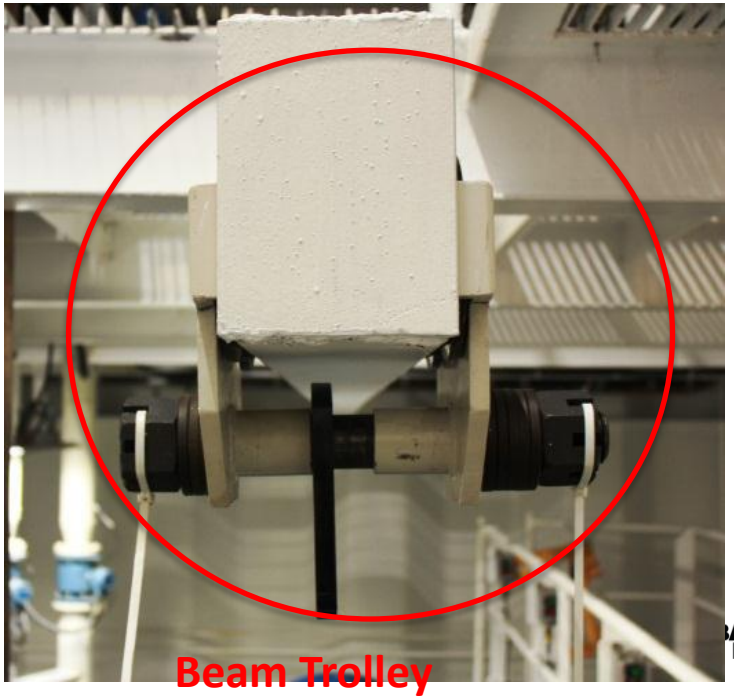
DROPS… still harming

Two instrument technicians were working in the centrifugal pump room on a stimulation vessel. A third-party worker standing on an upper level in the centrifugal pump room was moving a beam trolley.



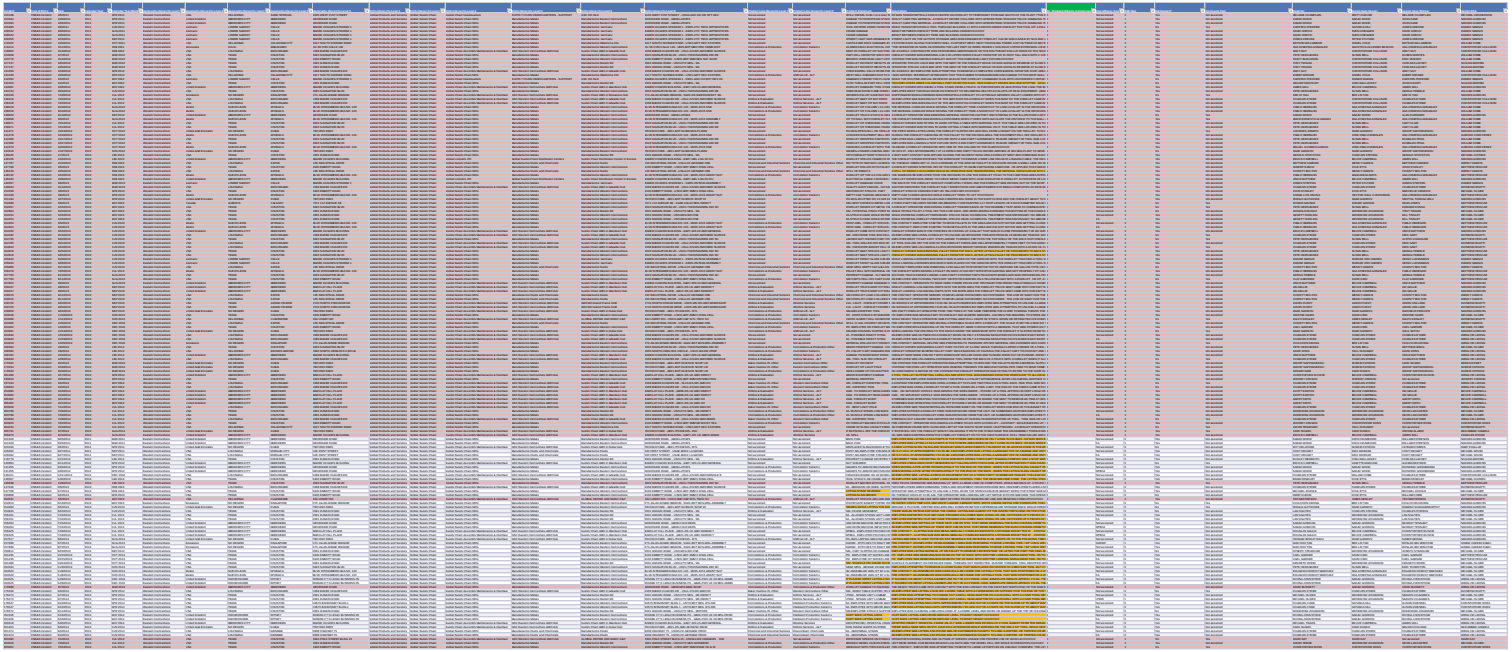
Suddenly, the trolley detached from the beam, bounced off an electric motor (the dark green device in the photo) during course of the fall, and struck a technician, resulting in a lost time injury.



The trolley weighs over 80 pounds and was dropped from over 10 feet high.

A tribute to the injured and…decreased

Year in year out, numerous lives are changed/ lost to dropped objects *



DROPS – present and still harm in O&G!

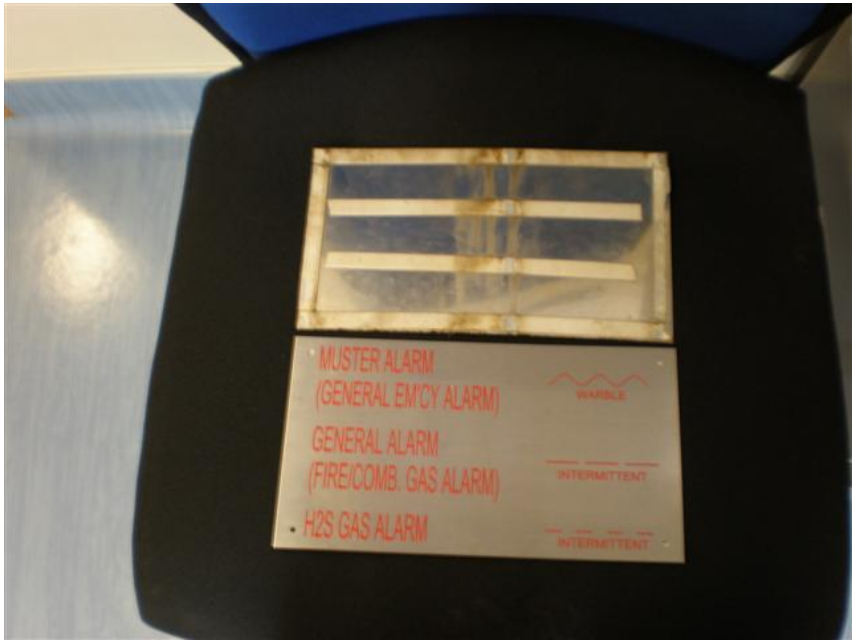
* Denote: The list only represents a **small portion** of incidents involving dropped objects in O&G industry.

Main Topics

- Dropped Objects
- Data Drilling – Principles & Foundation
- 4-year study – Learnings & Forward Looking Plan

Before we start…

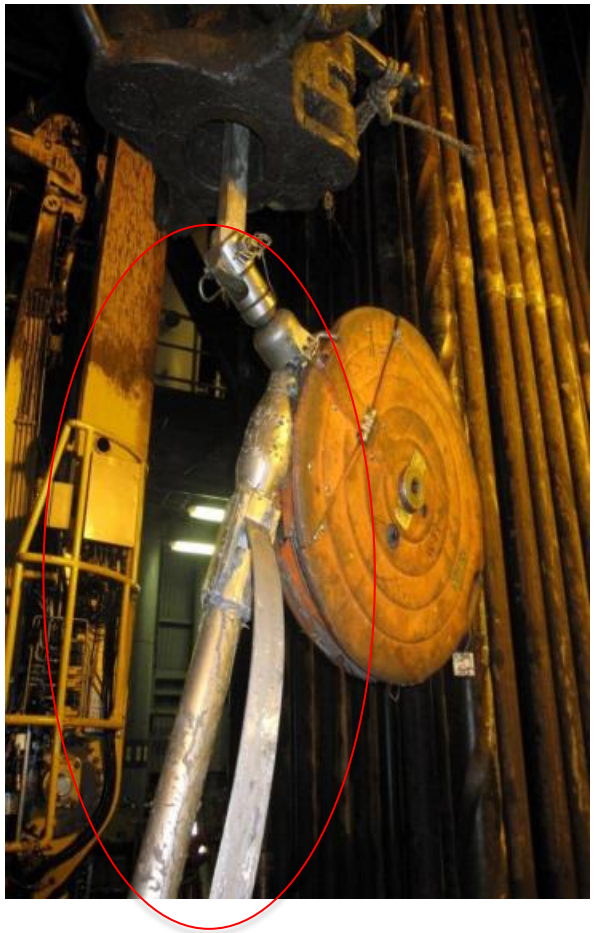
A "**dropped object**" is any item that falls from its previous position. This covers all items, materials or objects of any mass / density.



2 types of dropped objects:

- Static Dropped Objects– any object that falls from its previous static position under its own weight.
- Dynamic Dropped Objects – any object that falls from its previous position due to applied force from equipment/machinery or moving object.

Potential Dropped Objects – Rig Env



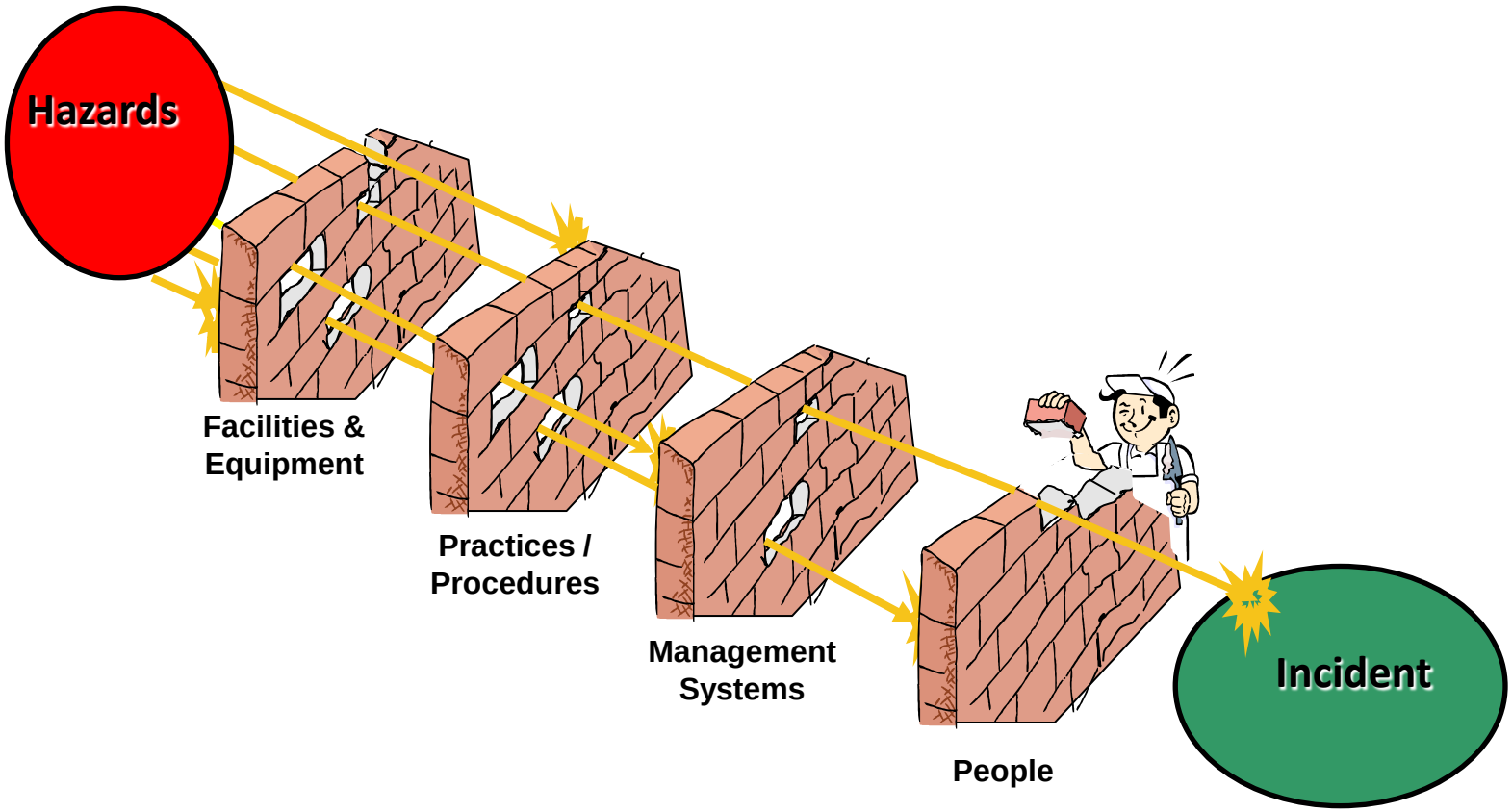
Wireline tool - *70kg @ 30m from drill floor*

Loose pen knife - *100g but sharp edges & potentially fall from over 50m when lifted*

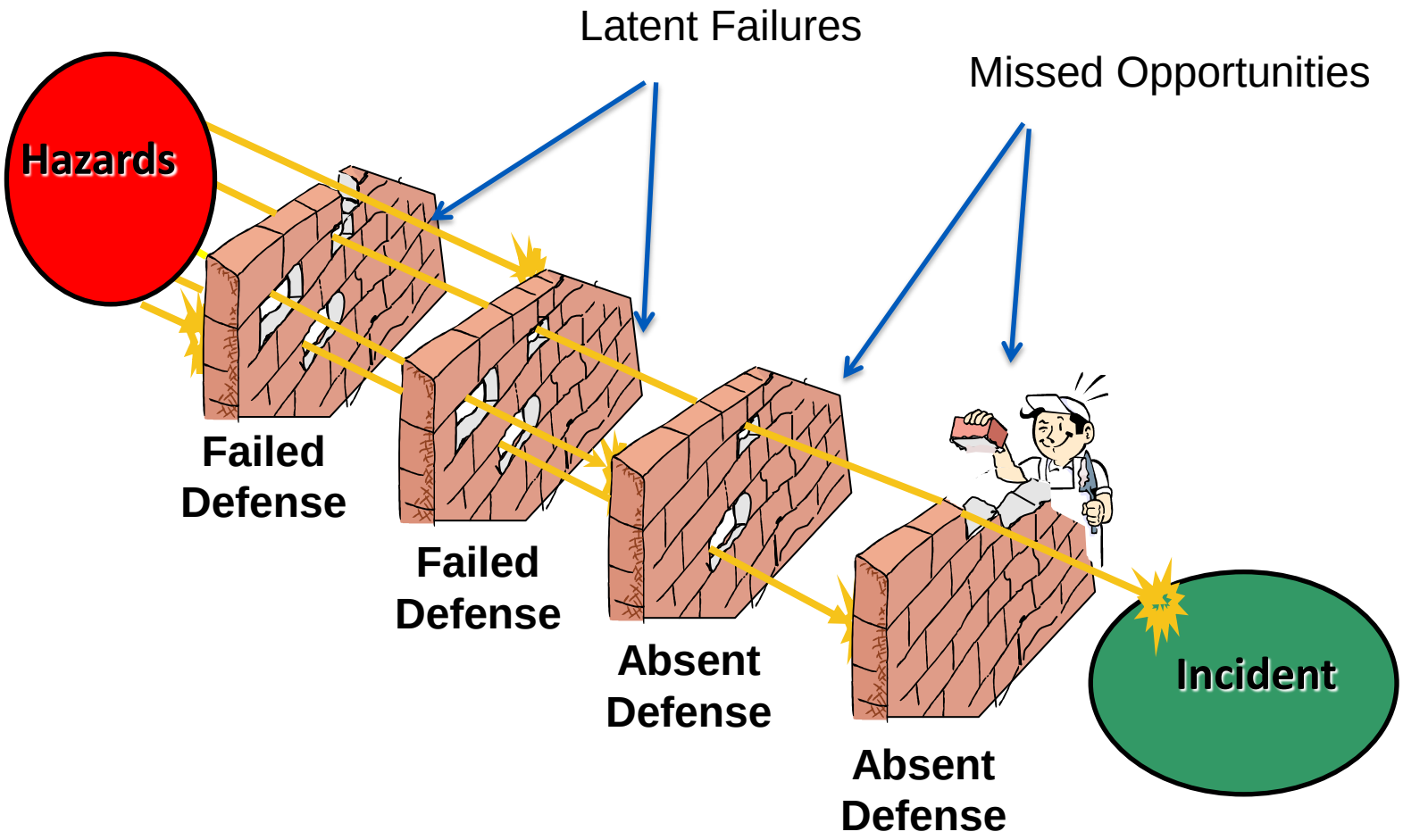
Problem solving?

…starts from understanding the issues

Foundation for Data Drilling



Another View



Overview of DROPS Study

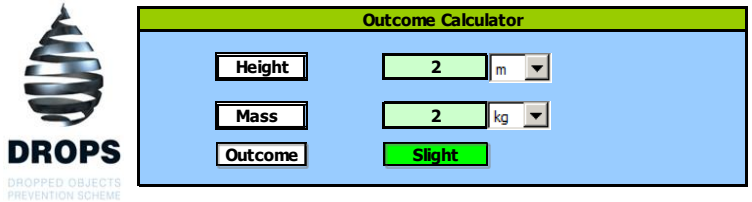
- Analyze dropped objects incidents from 2011 – 2014
- Involved studies of incidents on
  - Customer (field operations related) &
  - Baker Hughes locations (workshop, warehouse and manufacturing activities related)*
- Apply DROPS consequence calculator to evaluate potential outcome in reasonably worst case scenario
- Leverage granular data to reveal gaps and prompt for organizational learnings
- Map and align strategy with key customer focus areas

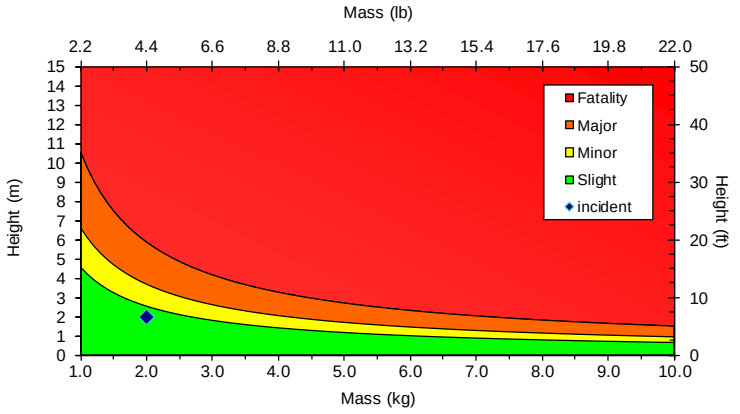
* Denote: Due to time limit, incidents that occurred on Baker Hughes locations are precluded from discussion of this slide deck.

Methodology for DROPS Study

- Use DROPS Calculator to evaluate “Could happen”/ potential outcome severity (Mass x Distance = Potential Consequence)
  - Calculator (endorsed by DROPS workgroup) provides a common benchmark in the classification of the potential consequences of a dropped object.

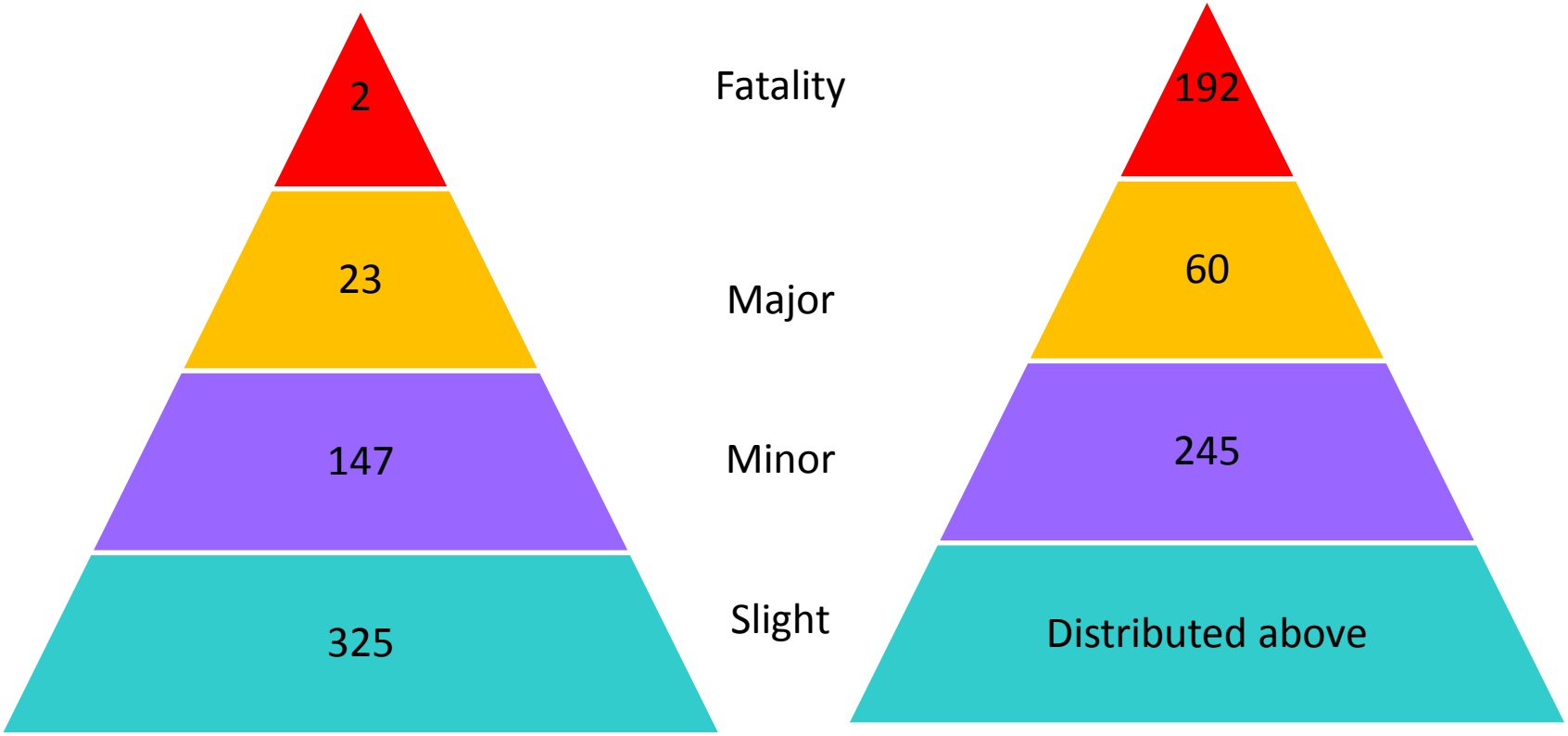
- *Root cause analysis*
  - *Based on investigation of ~500 incidents*
  - *Data aggregated to better understand gaps in current DROPS strategy*





Actual vs Potential

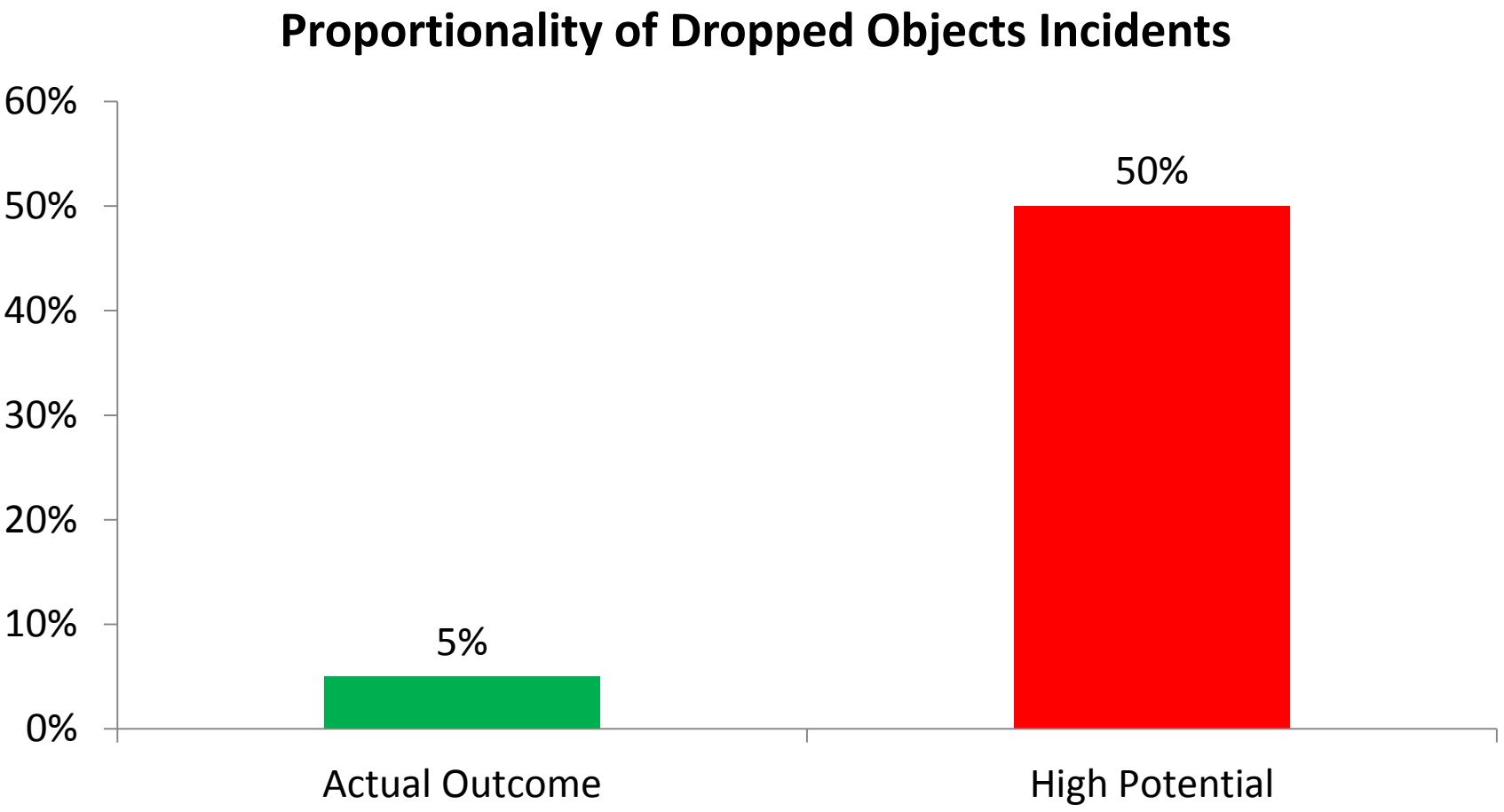
497 incidents involved field operations on customer locations



What happened
Actual Outcome

What could happen
Potential Outcome

Another View



DROPS represented 5-10% of all incidents.

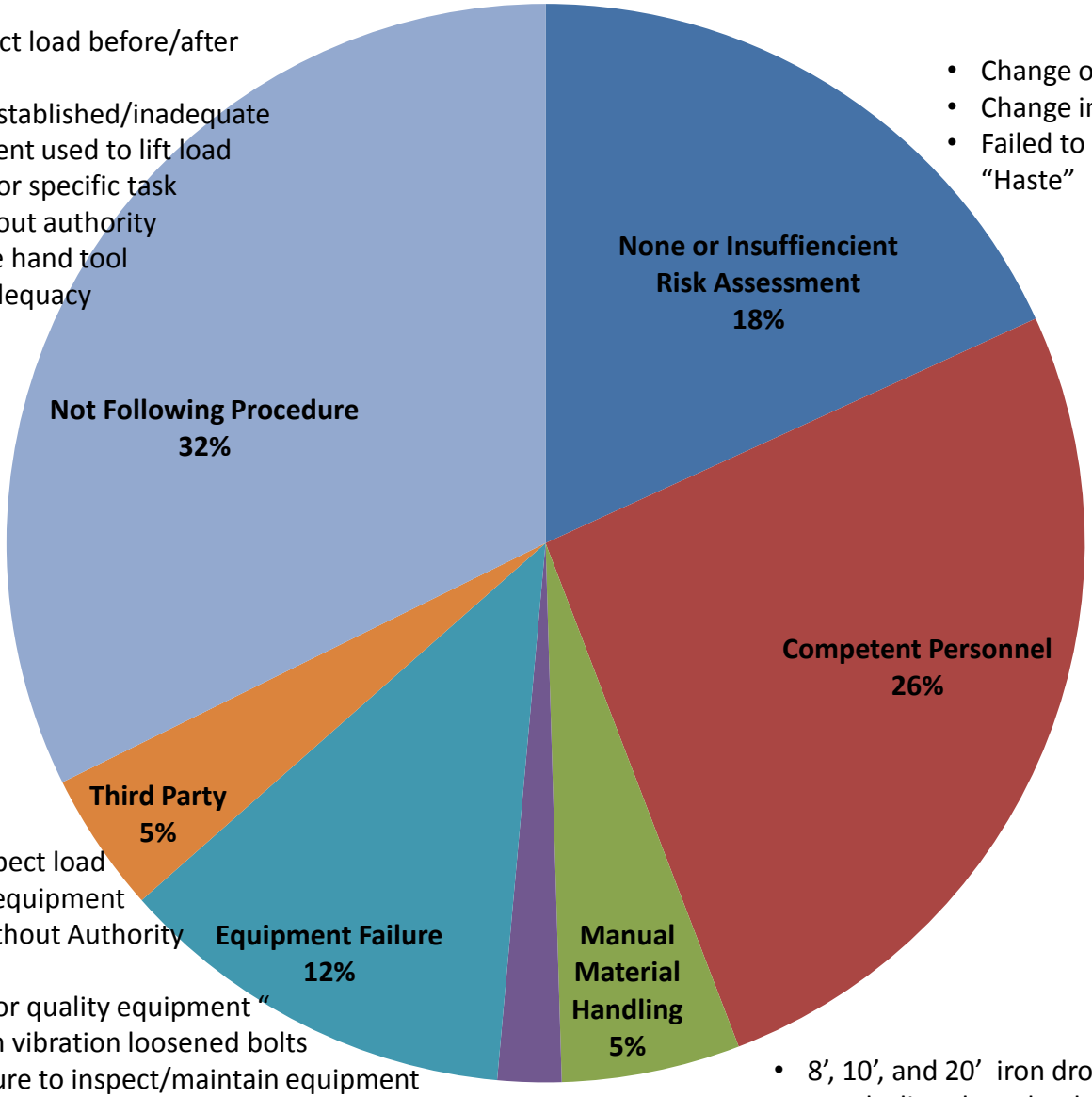
DROPS contributed to ~50% of Hi-Po.

Behind the data…
Uncovering the “real” issues

The underlying causes

- Failure to inspect load before/after move
- Red Zone not established/inadequate
- Wrong equipment used to lift load
- No procedure for specific task
- Operating without authority
- Failed to secure hand tool
- Procedural inadequacy

- Change of job task, supervisor not included in JS
- Change in operation and failed to re-plan
- Failed to conduct HRA/JHA/MOC
"Haste"



Failed to communicate with operator
Fatigue /Haste/Distracted/Shortcut
Improper set-up (splicing/rigging)
Improper lifting (forklift training)
Saw issue, but did not own it
Selected wrong equipment
Homemade tool

- Complacency
- Failure to inspect load
- Poor quality equipment
- Operating without Authority

- "Poor quality equipment "
- High vibration loosened bolts
- Failure to inspect/maintain equipment

- 8', 10', and 20' iron dropped while performing two man lift
- Hands directly on load and slipped from grip
- Lost grip of tagline/cable

We have identified gaps in our process.

How do we take the next step?

IYDWYAD

YGWYAG

Note: If you do what you always do, you get what you always get.

DROPS – Precursors

Red Zone Policy

Identify and manage restricted zones prior to L&H and working at height.

Reliable securing

Follow reliable securing best practice for routine operations.

Competent Workforce

Embed DROPS into Baker Hughes Rig Certification process.

Identify DROPS Risks

Fine tune MOC/HRA process and supplement with DROPS picture book/ bow-tie.

Inspect & Maintain

Implement risk based inspection/maintenance with track record.

DROPS…two cents for other organizations

- Starts from a change of perception
  - "It's not a big issue"
  - From misperception to full appreciation of actual and potential
- Open mind for a change
  - "Why do we need to change? We've always done it this."
  - Drawing lessons from others – including other industry
    - NASA FOD program/ cross corporation/ industry
- Re-position ourselves to be true industry leader
  - "It's customer/ rig contractor's responsibility"
  - Taking ownership and proactively collaborating with interested parties