11:00 am – 12:00 pm

HUMAN ERROR, and the concept of controls and error proofing in the light that errors are ever-present –

Guest Speaker Dr. Matt Hallowell

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Human Error

Dr. Matthew Hallowell
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Agenda

Defining Error

Classifying Error

Addressing Error

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Anna Davis
@radscientist_

I just walked into my room holding the remote and a glass of chocolate milk and I meant to toss the remote into my bed but instead I tossed the glass of chocolate milk onto my bed

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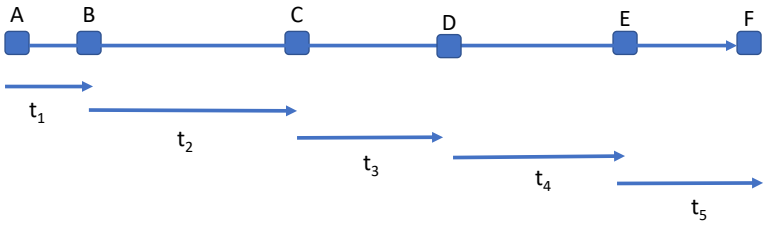
Human error is a deviation from intention, expectation, or desirability.



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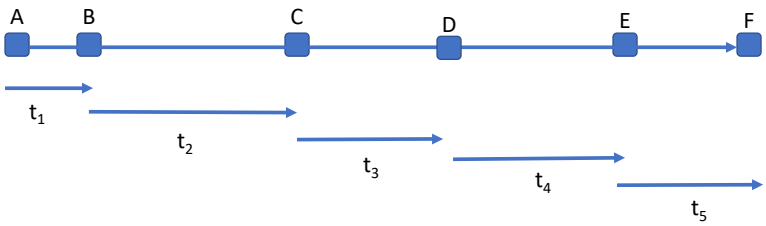

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Error
Intended Action
Action was well executed, but the plan was bad.
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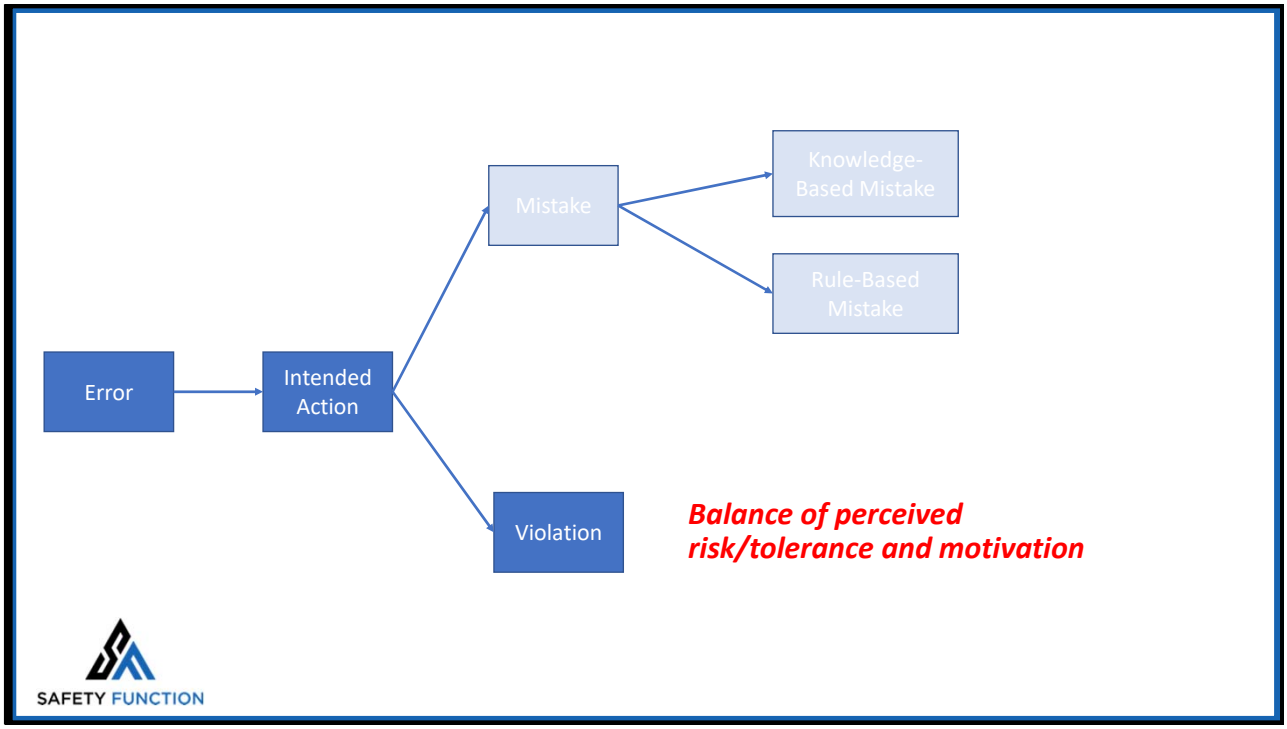
Error
Intended Action
Mistake
Knowledge-Based Mistake
Rule-Based Mistake
Violation
Balance of perceived risk/tolerance and motivation
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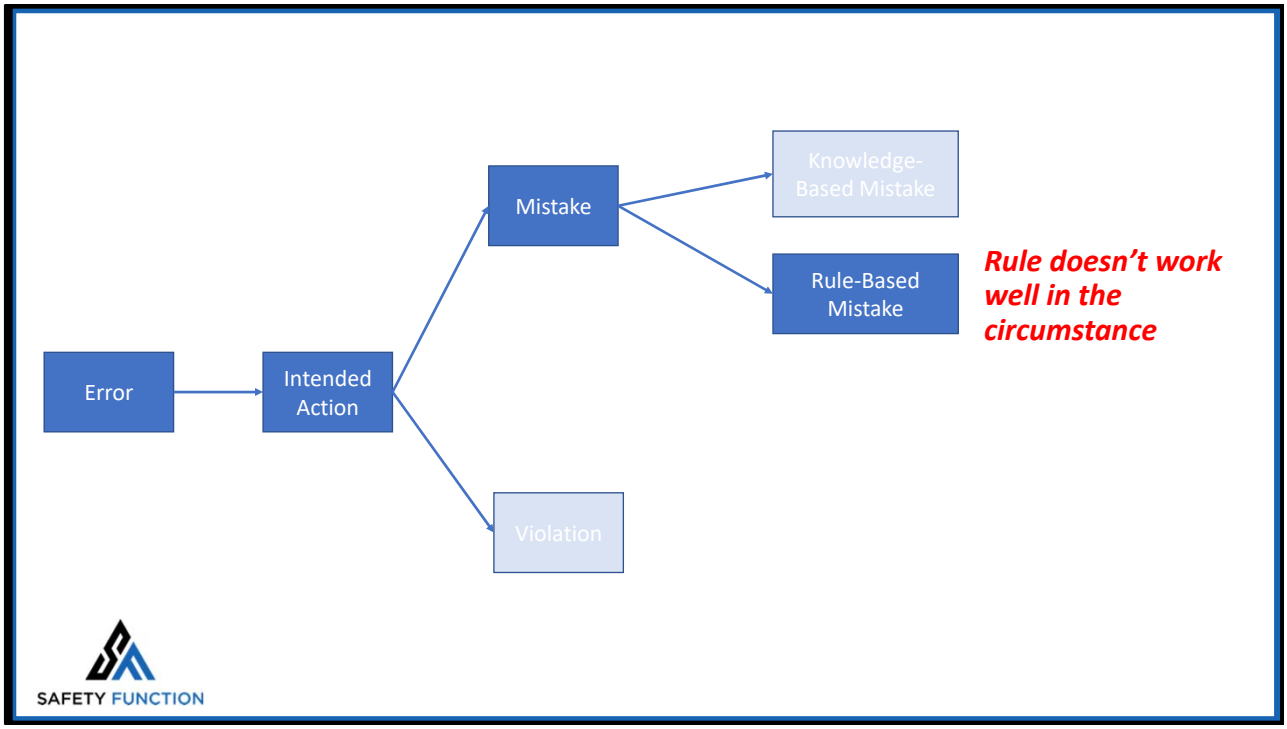

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Rule-Based Mistakes

Application of a bad rule: The company sets a rule that is never ideal (rare).

Misapplication of a good rule: A rule that does not apply in all situations (relatively common).

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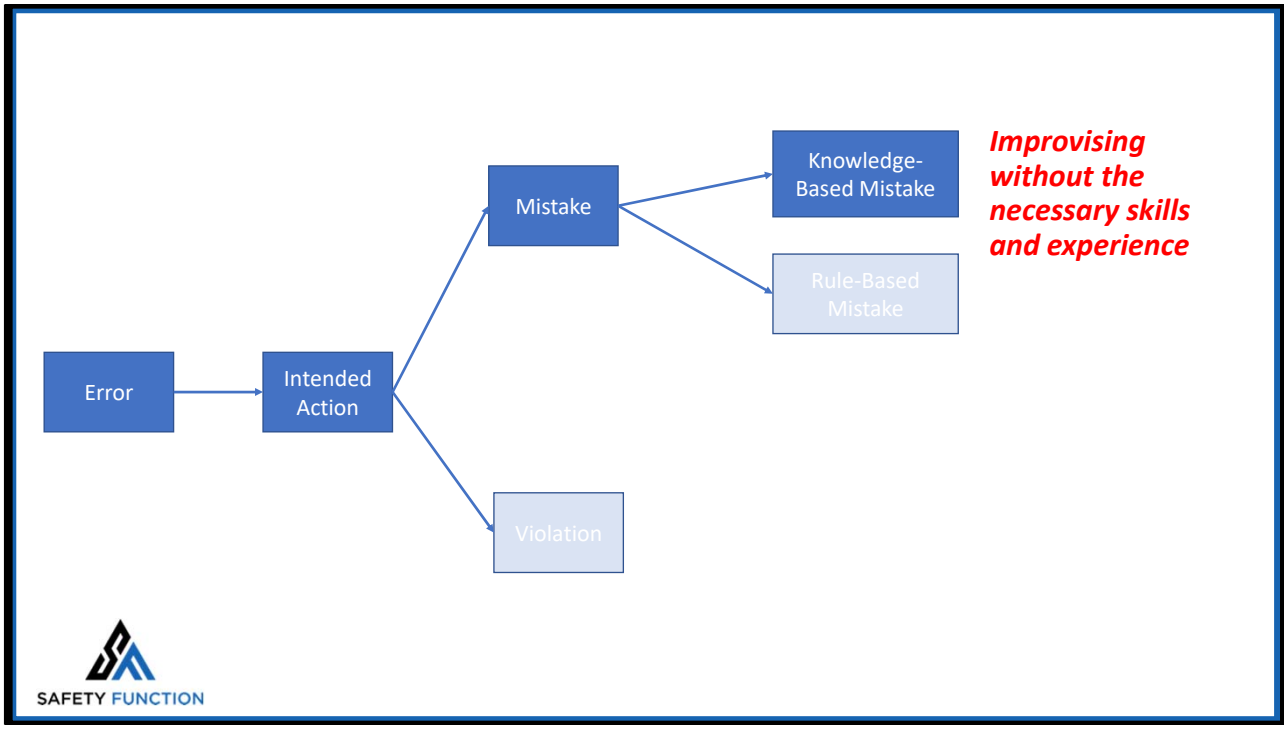

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Knowledge-Based Mistakes

The individual doesn't know the safe action, but they proceed anyway (improvise).

- We make decisions in an error-driven process:
  1. Have a goal and sequentially initiate actions
  2. Observe the extent to which we are successful
  3. Modify our actions to minimize the difference between our actual state and our desired state

- ***Common and Preventable: We should design processes so that we are NEVER in this situation***

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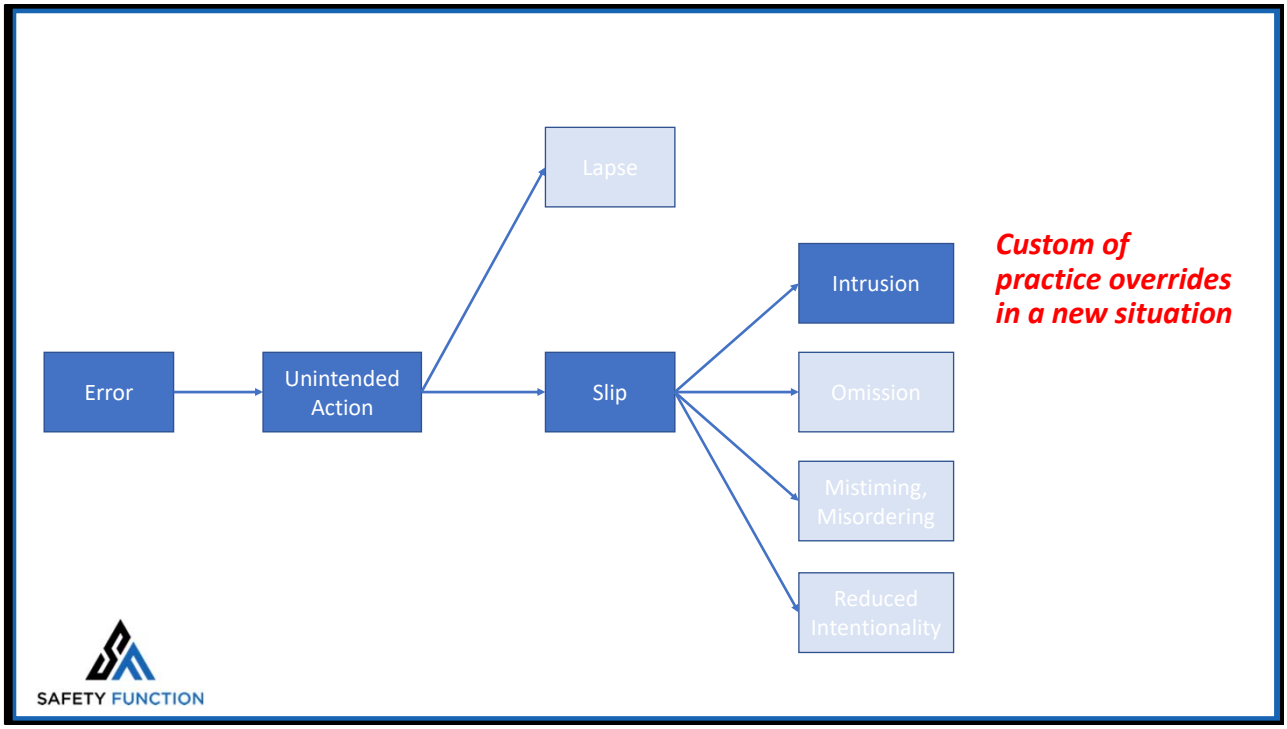

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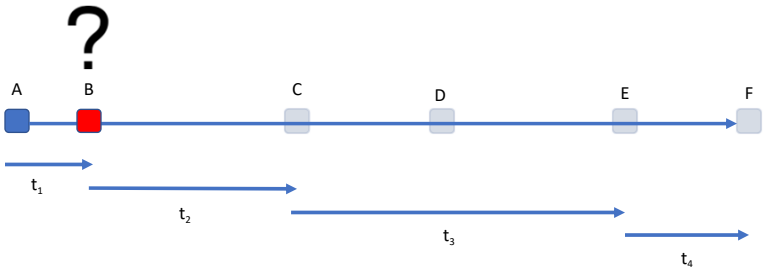
Lapse (Memory Failure)

Example: A worker has a red control for lowering, a blue control to swing left, and a green control to swing right. The worker intends to swing right but purposely uses the blue control. There were no distractions. In retrospect, the worker knows the correct action and can take proper action.



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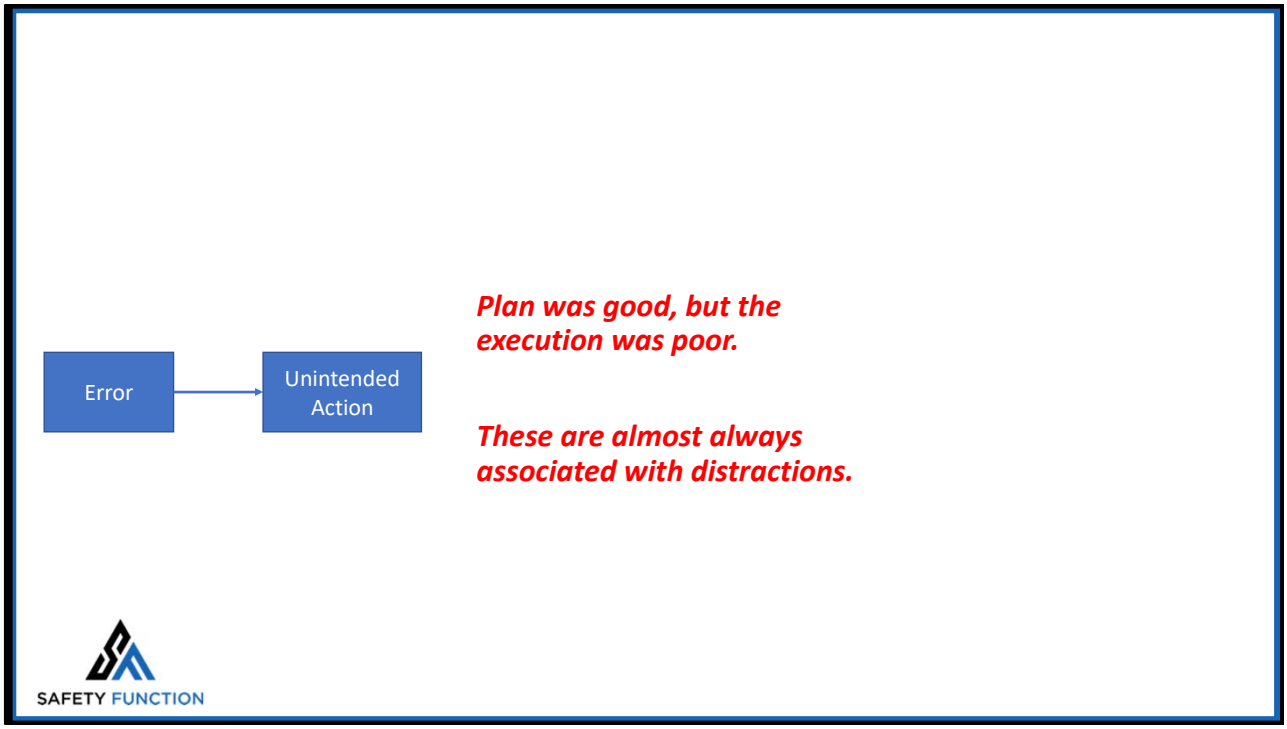
Error
Unintended Action
Plan was good, but the execution was poor.
These are almost always associated with distractions.
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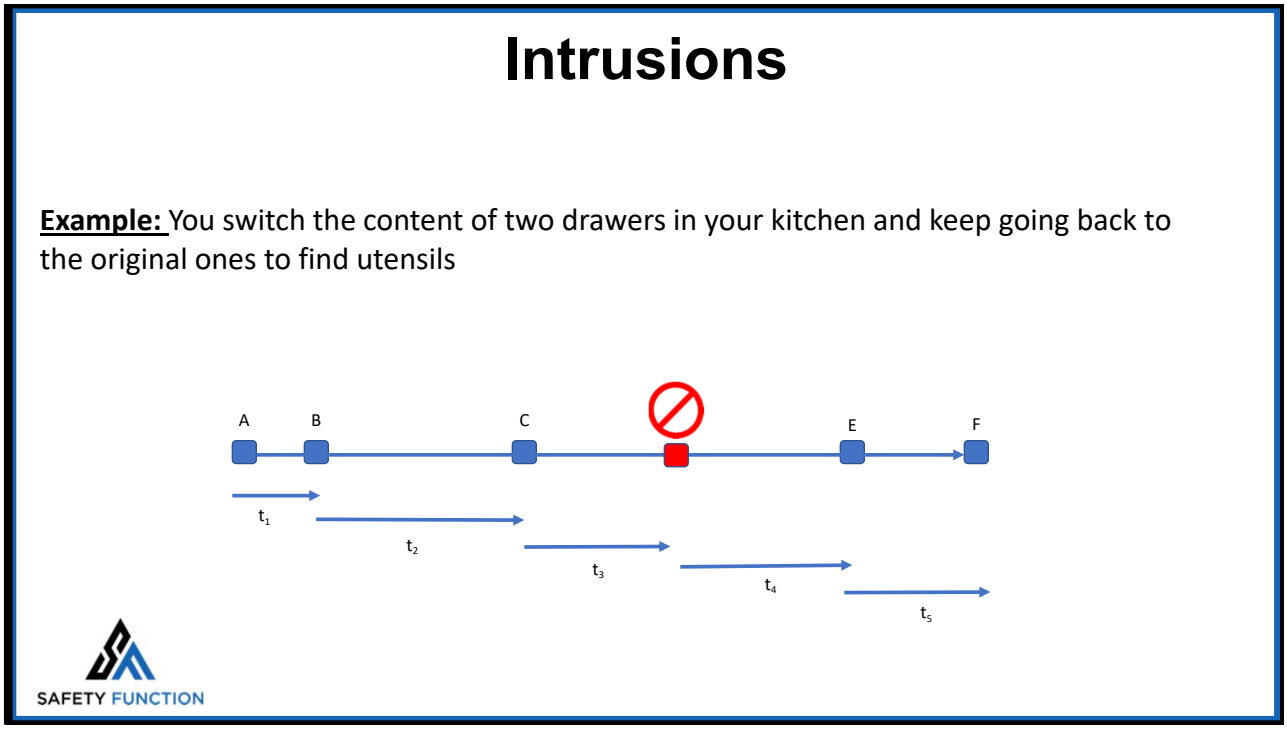
Intrusions
Example: You switch the content of two drawers in your kitchen and keep going back to the original ones to find utensils
A
B
C
E
F
t1
t2
t3
t4
t5
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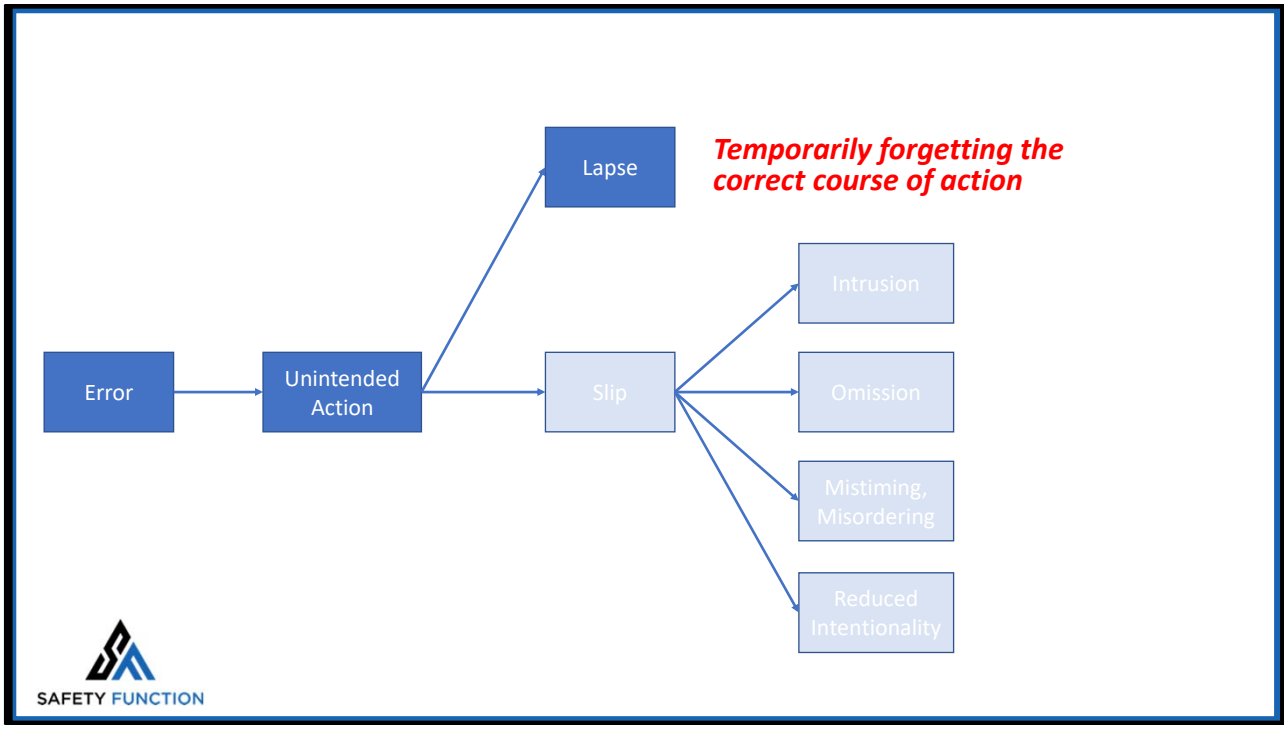

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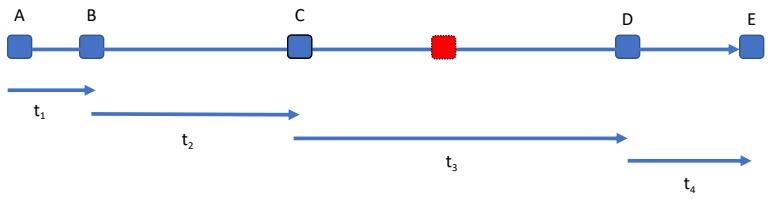
Omission

Example: I walked to the bookcase to get a dictionary. When I pulled the dictionary, several books fell to the floor. I put them back and returned to my desk without the dictionary.



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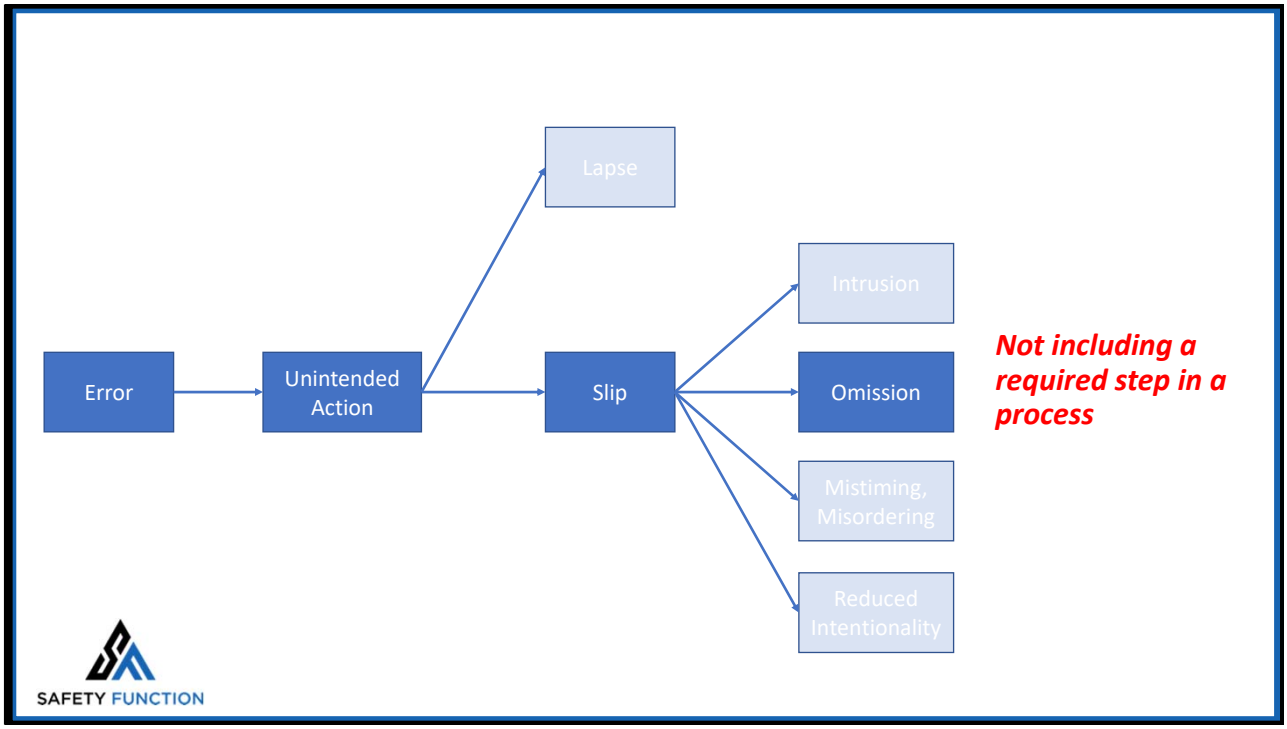

Not including a required step in a process

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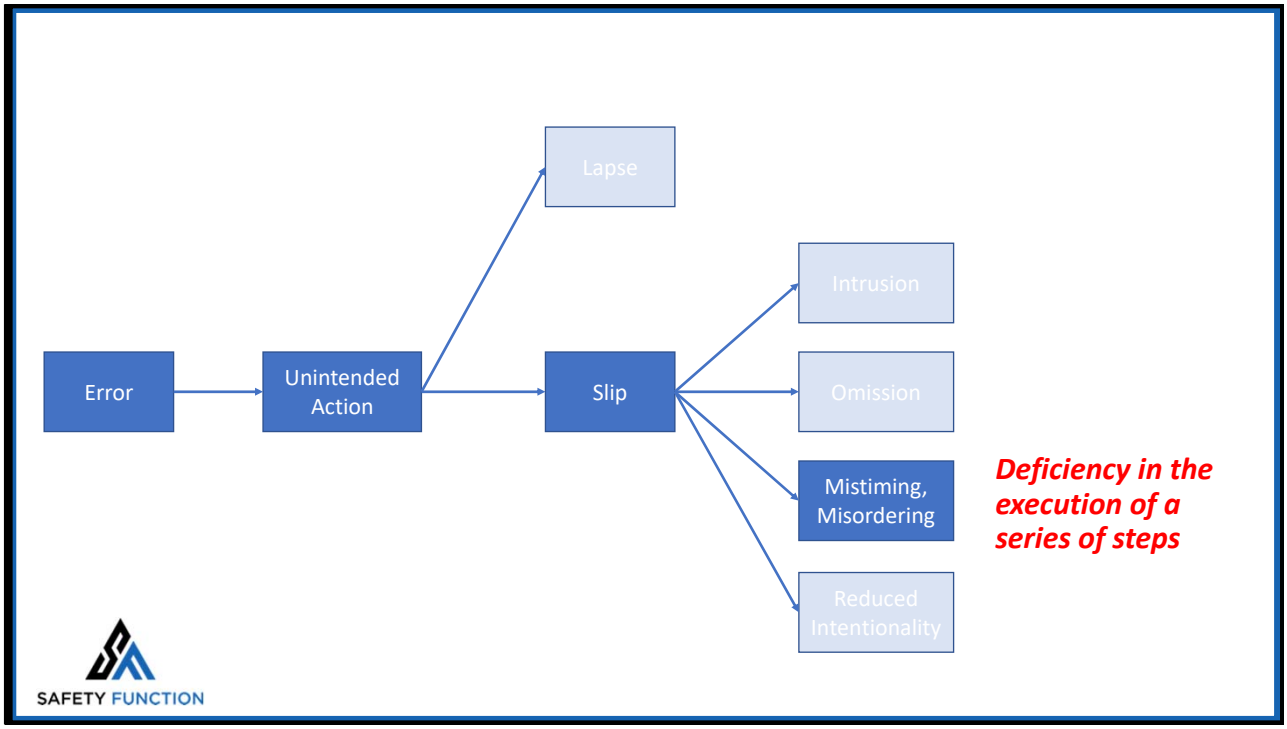

Deficiency in the execution of a series of steps

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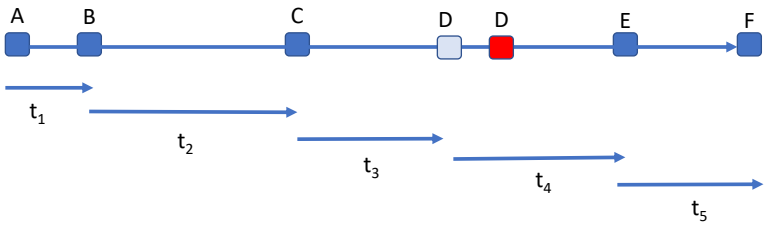
Misordering and Mistiming

Example: I was making Pad Thai and added eggs before sugar



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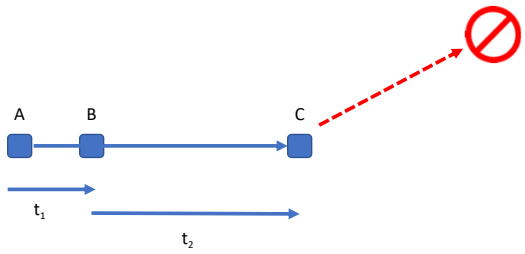
Reduced Intentionality

Example: You walk into the kitchen and can't remember why you're there.



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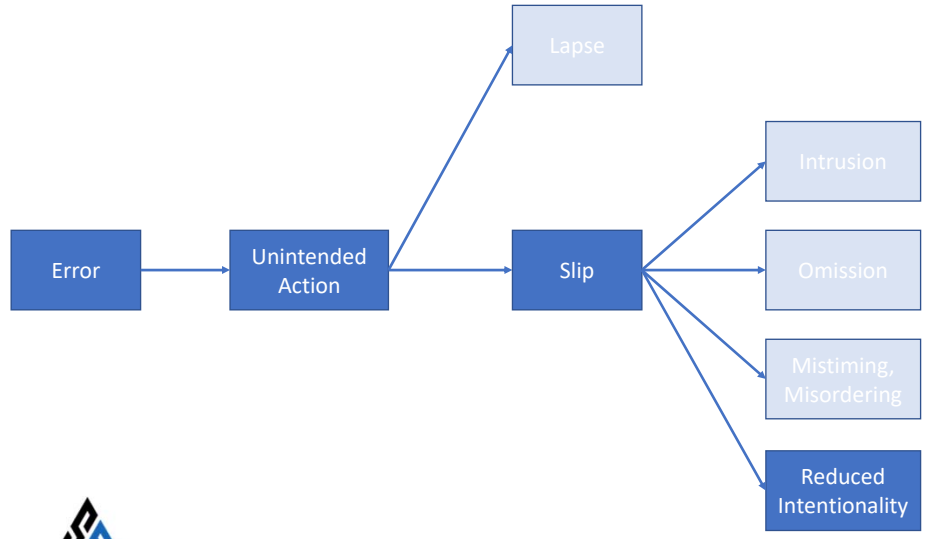

A mental state whereby an individual cannot recall the intent of an action

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"*To err is human*" – Alexander Pope (1709)

- Even the best people make mistakes
- Taken over enough time, the probability of human error in any circumstance is 1.0
- Therefore, we must treat error as expected and protect against it
- Error is present in success and failure (not a precursor)

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The best course of action is to add controls that are difficult to defeat by human error.

Let's start by thinking of work as a closed system

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Driving Examples

Error Proofing – Including physical controls to eliminate (the impact of) human error

- Must press on brake to shift into drive
- Cannot shift into reverse while driving forward
- Key will not remove from ignition without car in park
- Phone Bluetooth will not work wile driving
- Speed governor

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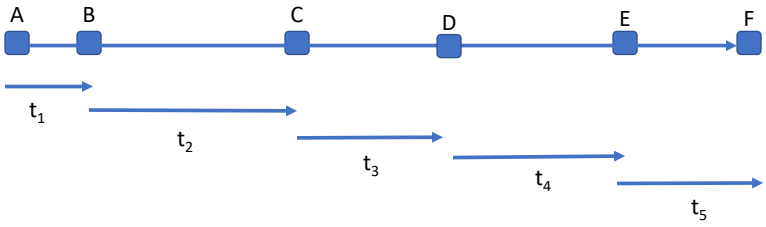

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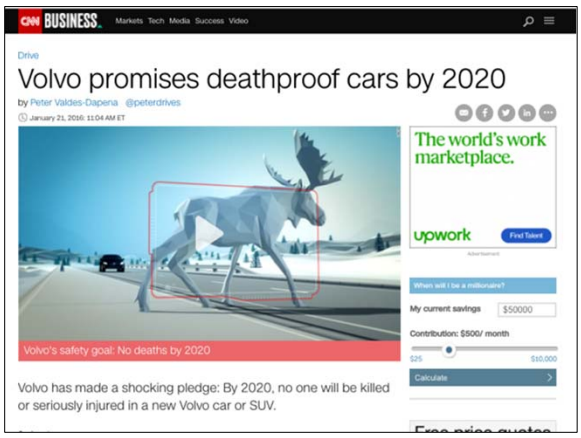
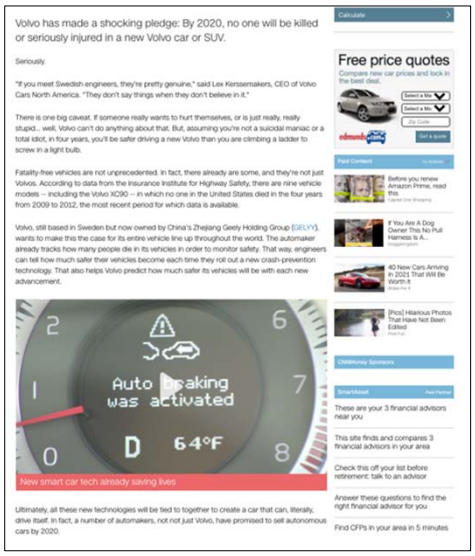
Volvo Case Study





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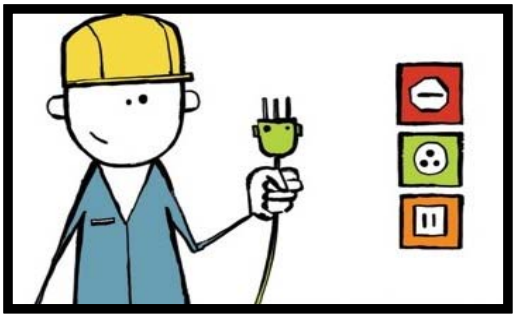
Design of everyday things…



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Reminders

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"Point and Call"
aka
shisa kanko (指差喚呼)

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The second-best method is to design systems so that errors are less likely.

Consider work to be an open system…

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Work Examples

Error Proofing – Including physical controls to eliminate (the impact of) human error

- Lock-out tag-out (LOTO)
- De-energize
- Fall protection
- Trench boxes
- Guard rails/barricade

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If someone wanted to be severely injured here, how would they do it?*

***Without purposefully defeating a control**

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Point and Call

Reduced human error by 85% (Railway Tech Research Inst.)

Adopted by the NYC MTA and eliminated serious injuries and fatalities from door openings

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Redundancy is Key

1. **People will make errors (willfully and unwittingly)**
2. **Machines and technology will malfunction**

Law of probabilities (with redundancy, a 1 in 1,000 chance in error and 1 in 1,000 chance of malfunction becomes a 1 in a million chance).

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