Butterflies and Avalanches:

Common Errors in Avalanche Rescue

Dale Atkins

CHAOS = DISORDER

Science:

small differences in initial conditions may result in very different outcomes

Atkins, 2011

CHAOS = DISORDER

Rescue:

small differences in initial conditions may result in very different outcomes

Atkins, 2011

Problems and errors in avalanche rescue are often attributed to “chaos” of rescue.

Atkins, 2011

HUMAN ERROR – DEFINITION

An error is a failure of achieving the intended outcome in a planned sequence of mental or physical activities when that failure is not due to chance.

Atkins, 2011

UNDERSTANDING ERRORS

4 Parts

What?

When?

How?

Why?

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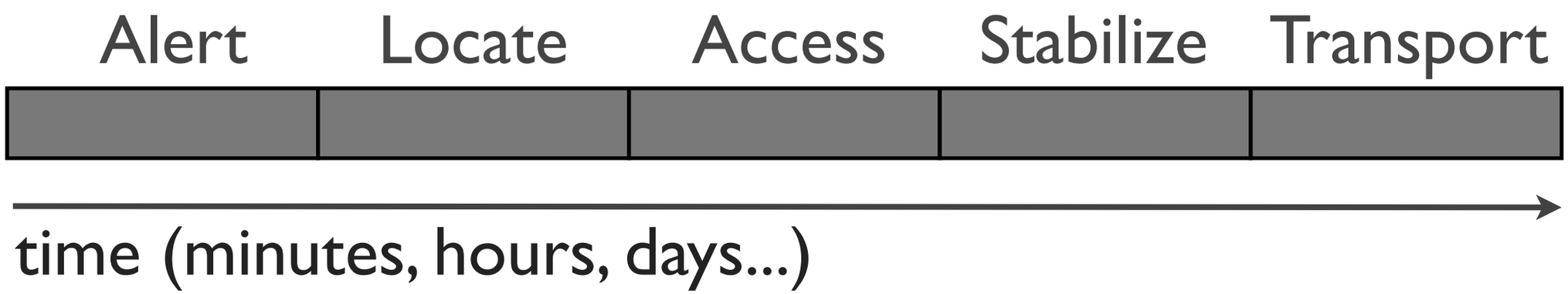
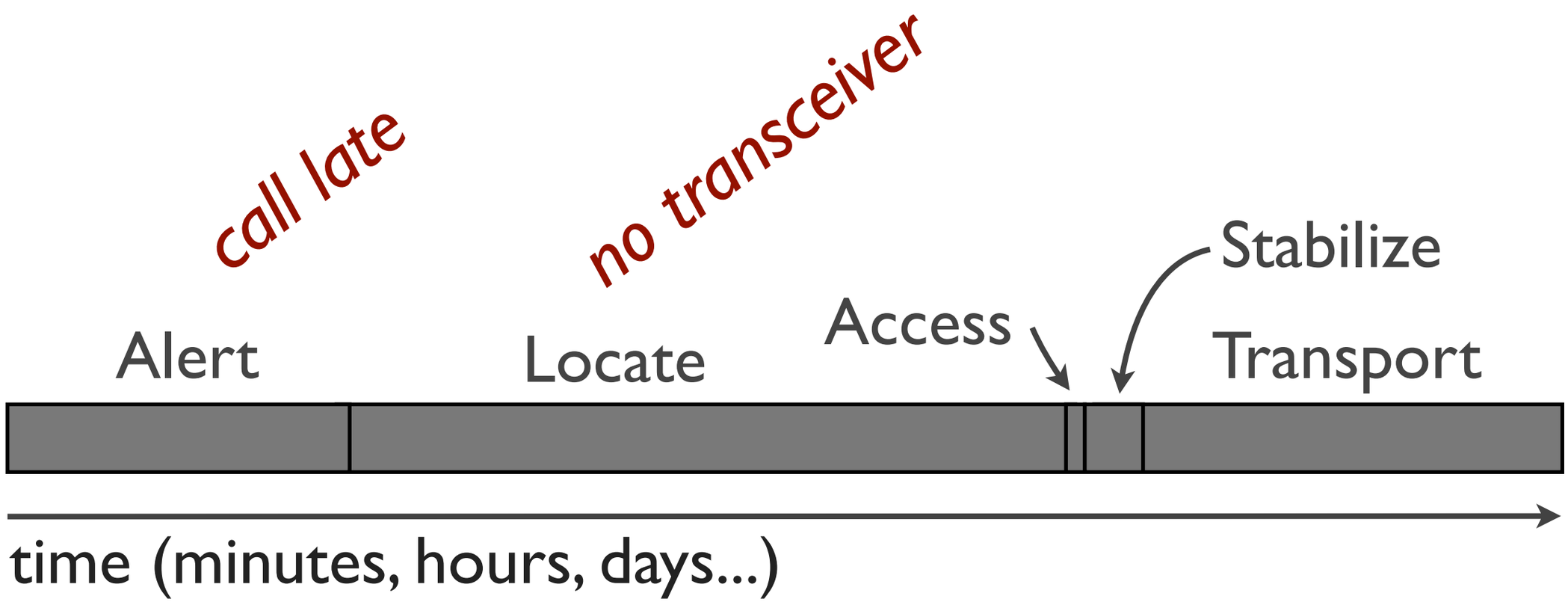
WHEN?

Five Core Phases of SAR



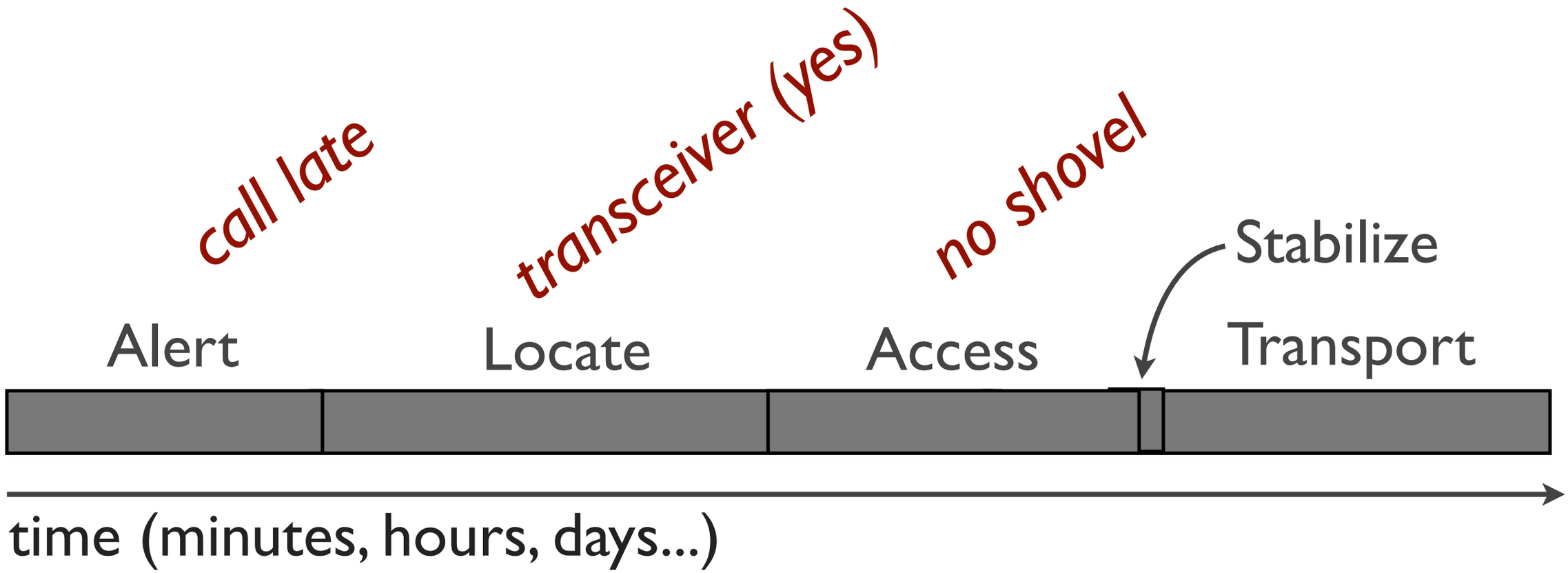
Atkins, 2011

WHEN?



Atkins, 2011

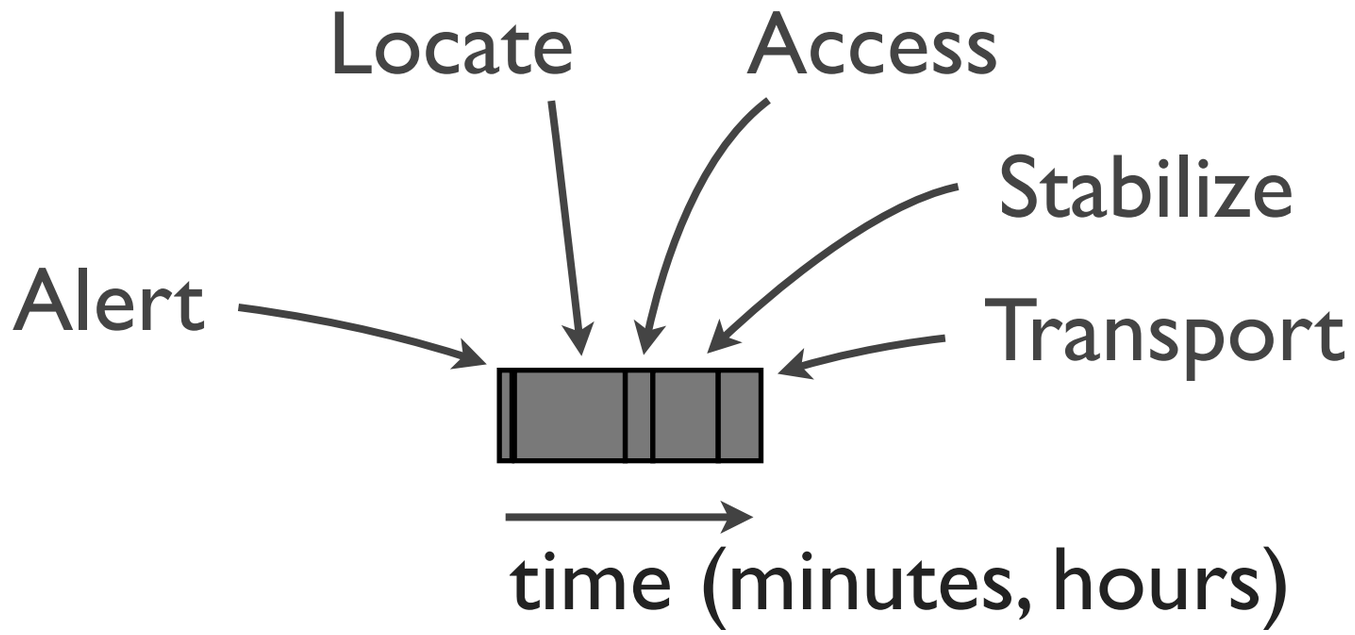
WHEN?



Atkins, 2011

WHEN?

Perfect Rescue



Atkins, 2011

DATA

US Rescues from 1980-2011

Total US accidents reported = 2364

Companion Rescues = 306

Organized Rescues = 201

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CAUTION of PERCENTAGES

Significant Bias:

Rescue details and errors are under reported.

Atkins, 2011

RESULTS – SHORT VERSION

We ALL make errors!

No new errors, same errors
or variations.

Accumulation of small errors
may lead to bigger problems.

Atkins, 2011

SERIOUS ERRORS

Organized Rescue:

very few ... ~4%

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TRENDS

Organized Rescue:

caught in groups
(average 2.6 caught)

groupthink

[resulted in 2 deaths
(1 rescuer & 1 patient)]

Atkins, 2011

SERIOUS ERRORS

Companion Rescue:

few ... ~10%

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TRENDS

Companion Rescue:

overconfidence

poor rescue skills

[one known death & many unknown]

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ERRORS

Organization

Information

Tactics

Attitudes

Atkins, 2011

Organization

no rescue plan

leadership problems

improperly trained

inadequate physical condition

groupthink

Atkins, 2011

GROUPTHINK

Rational conformity without critical testing, analyzing, and evaluating ideas.

– Whyte, 1952; Janis, 1972

Atkins, 2011

Information

poor communications

inaccurate information

not re-evaluating after new information

mobile phones

SPOT, PLB

Atkins, 2011

Tactics

inadequate immediate search

lack of proficiency with beacons & recco

not using available resources (e.g. dogs & recco)

not carrying beacons, shovels, recco, saws, etc.

not searching the right area

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Attitudes

abilities are greater than capabilities

hasty generalization – dead body

reluctant to adopt new technologies

Atkins, 2011

NO NEW ERRORS

People / rescuers make the same mistakes repeatedly.

Atkins, 2011

SERIOUS ERRORS

Often result from an accumulation of small errors.

Atkins, 2011

Count the passes made by the white team.

Atkins, 2011

Did you see anything odd?

Atkins, 2011

INATTENTIONAL BLINDNESS

We fail to notice large changes when absorbed in the inspection of something else.

Atkins, 2011

(Bálint, 1907, Neisser, 1979; Simons & Chabris, 1999)

AVALANCHE RESCUE – GOAL

To perform an efficient, fast, and safe search and rescue in order to save a life.

Atkins, 2011

RESCUE CONTRADICTION

More rescuers and/or newer equipment does not always mean better rescues.

Atkins, 2011

RESCUE PARADOX

Sometimes “text book” rescues are slow, and sometimes “sloppy” rescues are fast.

Atkins, 2011

RESCUE PARADOX

Sometimes “text book” rescues are slow, and sometimes “sloppy” rescues are fast.

Sometimes “text book” rescues do not save lives, but sometimes “sloppy” rescues save lives.

Atkins, 2011

HARMFUL OUTCOMES

Incident:

non-life threatening – typically adds delays

Accident:

life threatening

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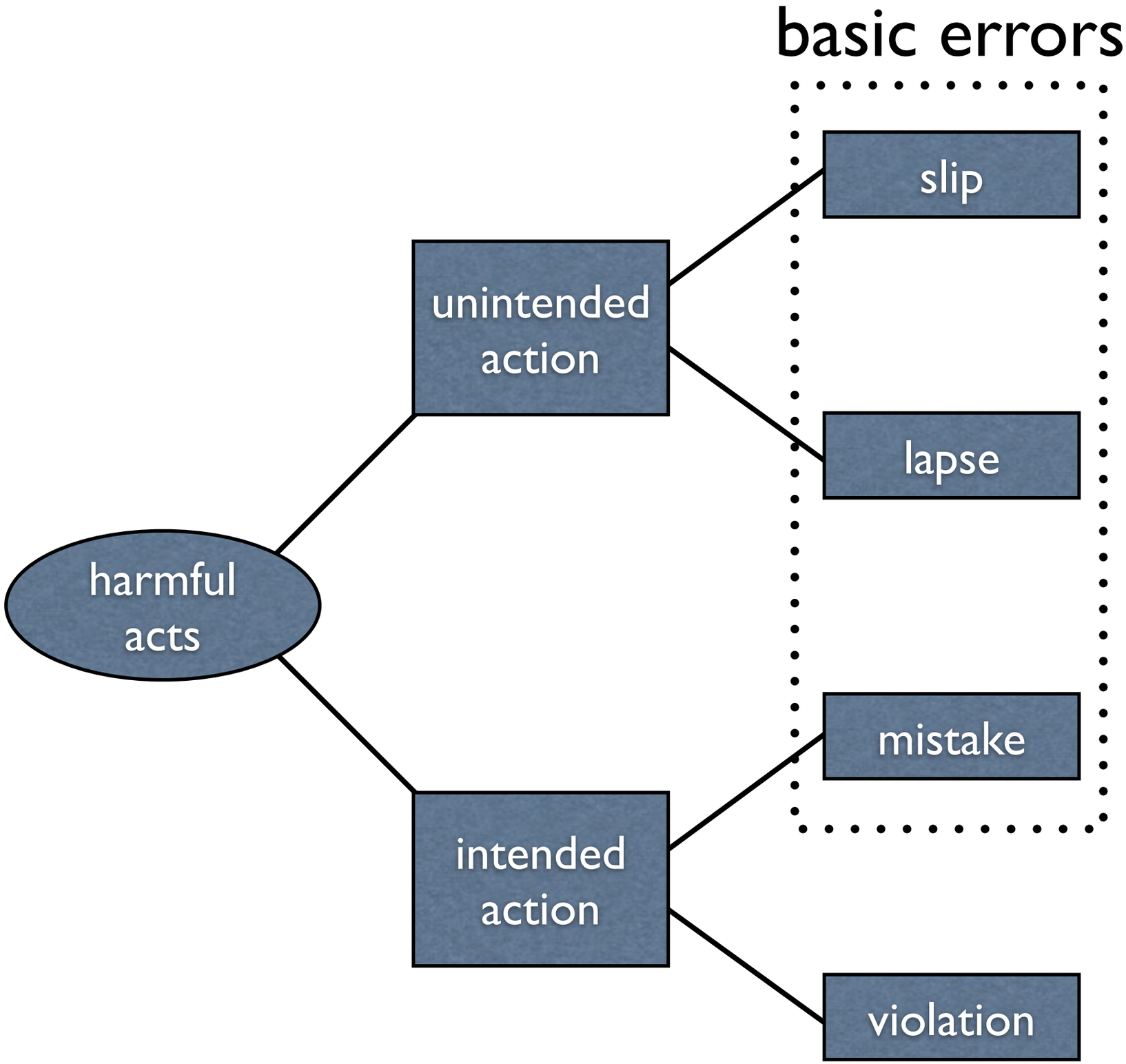
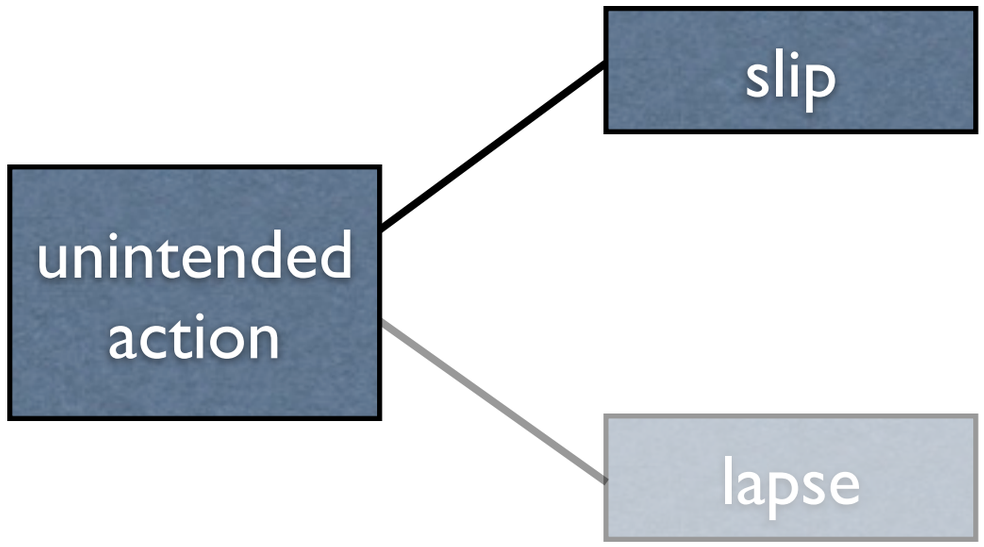


Atkins, 2011

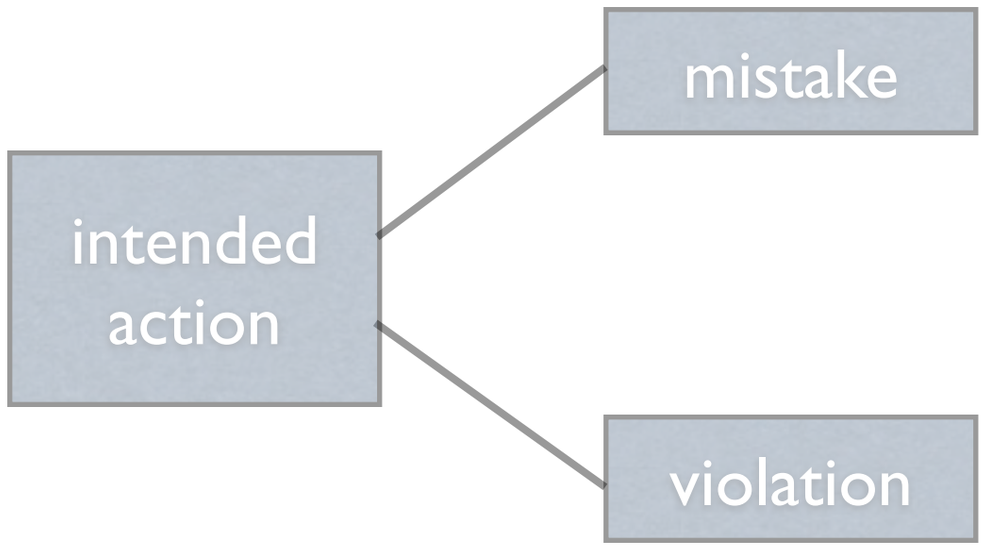
(adapted from Reason, 1990)



attentional failures

distractions

blindness



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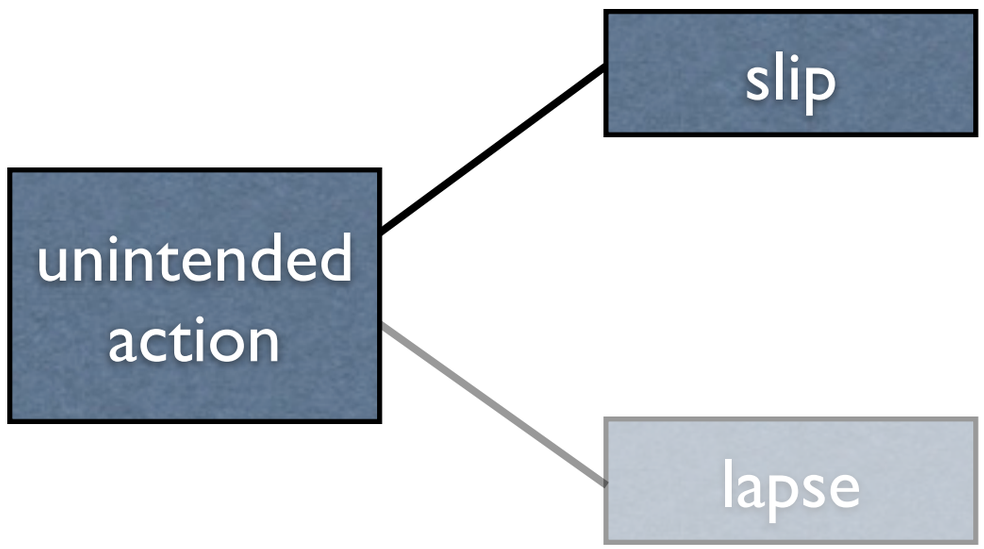


attentional failures

distractions

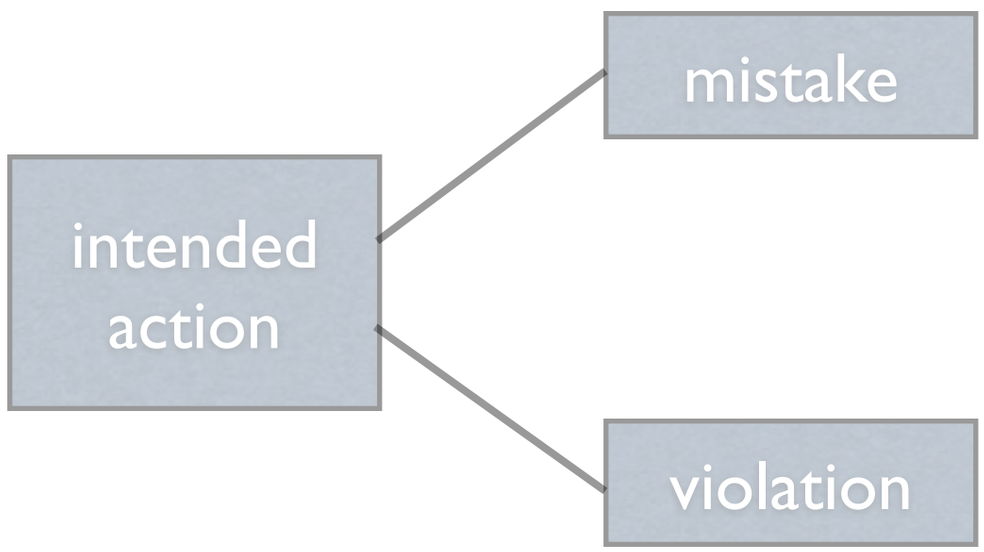
equipment problem

transceivers (arriving)

blindness

weather changes

snow changes



Atkins, 2011

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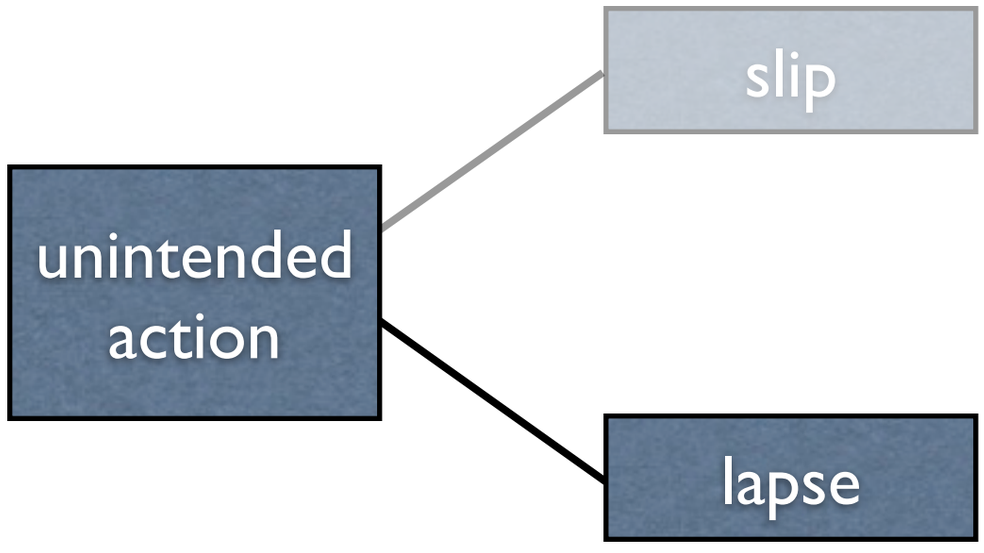


attentional failures

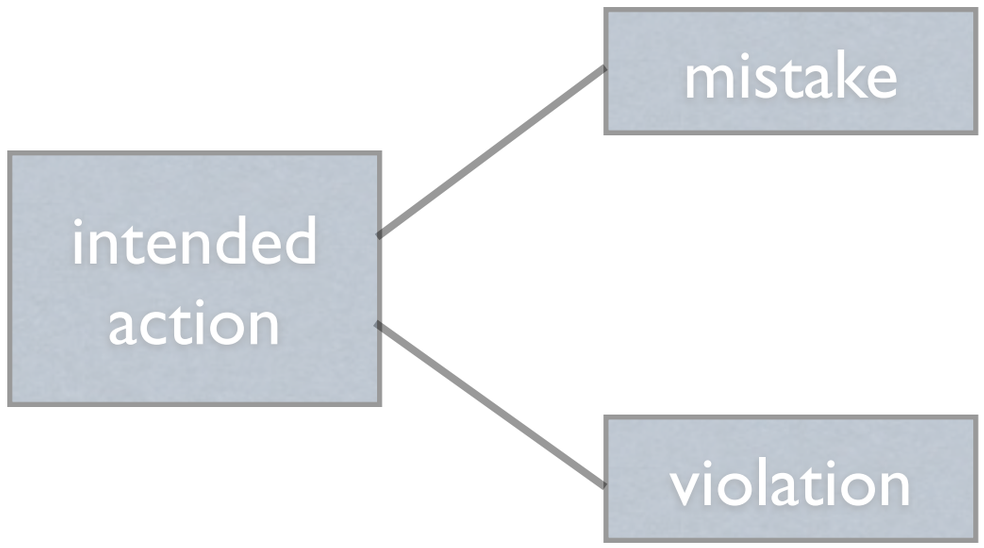
distractions

blindness

memory failures

place-losing

omissions



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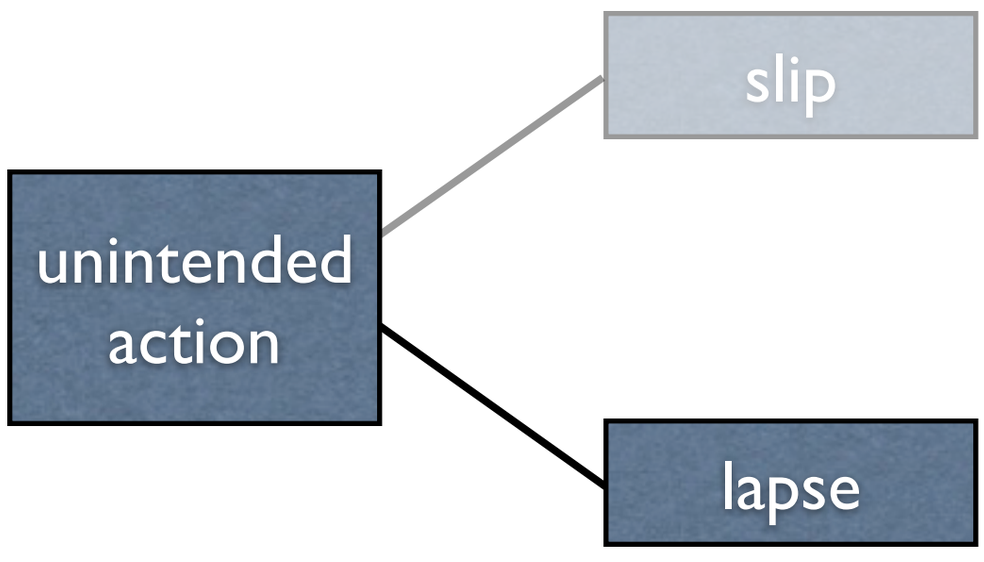


attentional failures

distractions

blindness

memory failures

place-losing

resources

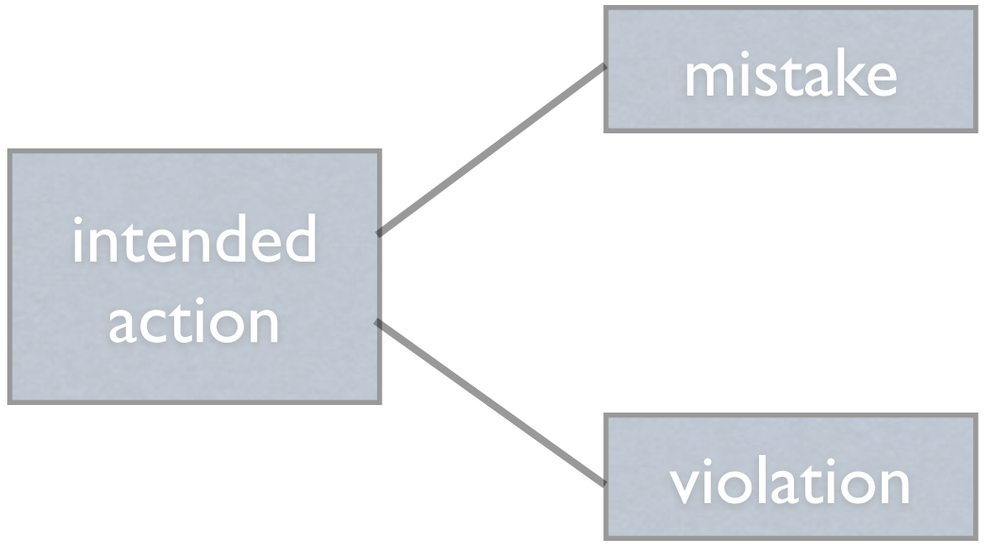
triage

not searching entire slide

transceiver rescue

omissions

transceivers/recco/dogs



Atkins, 2011

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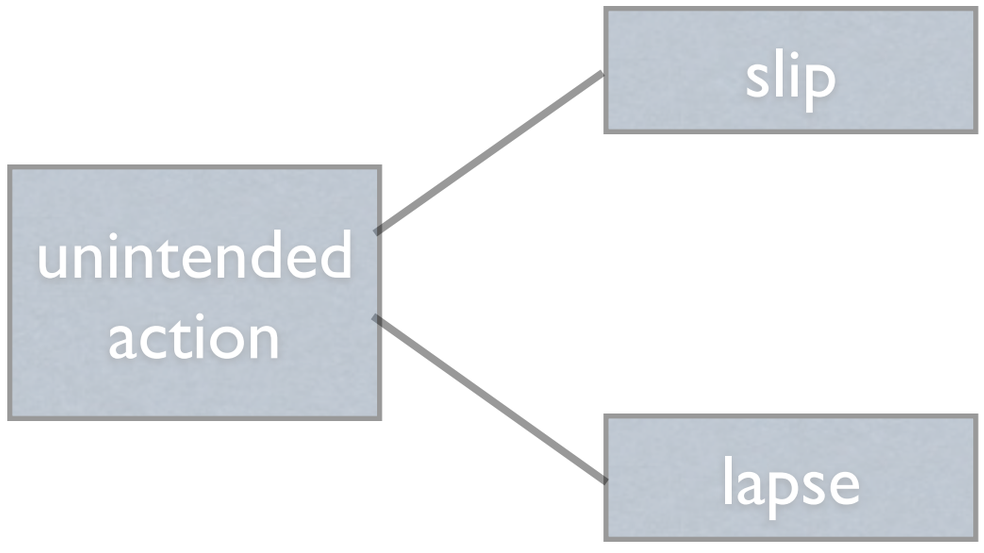

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distractions

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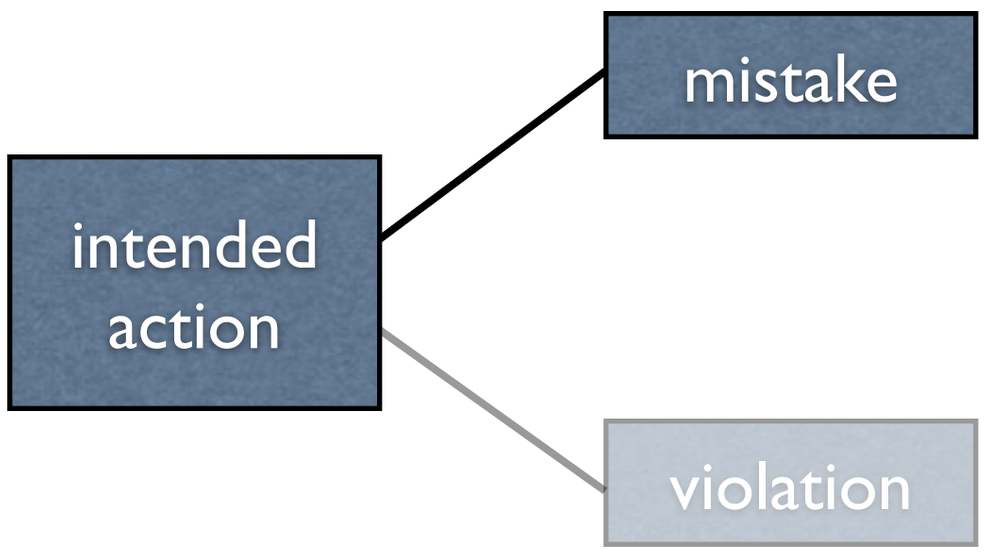


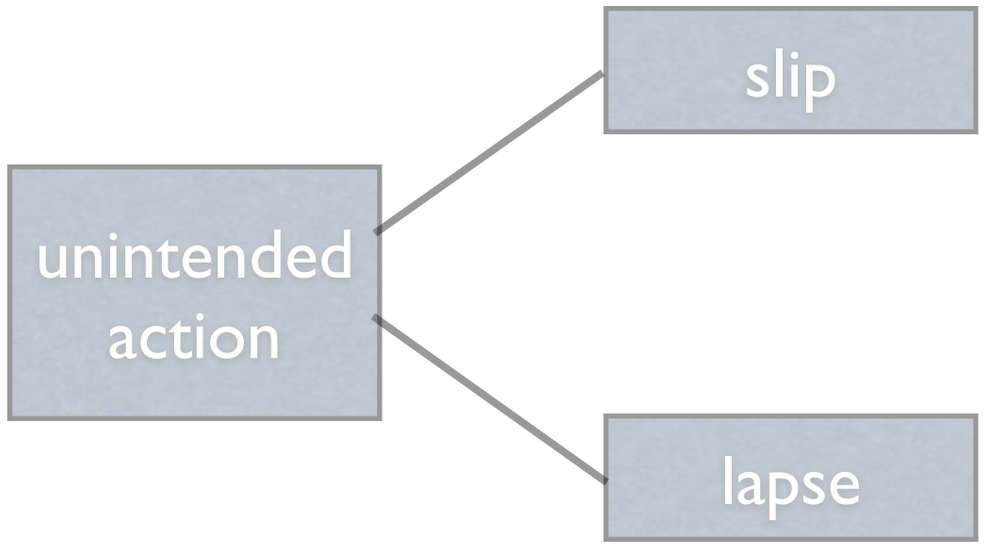
rules-based mistakes

misapplication of good rule

application of bad rule

Atkins, 2011

(adapted from Reason, 1990)



attentional failures

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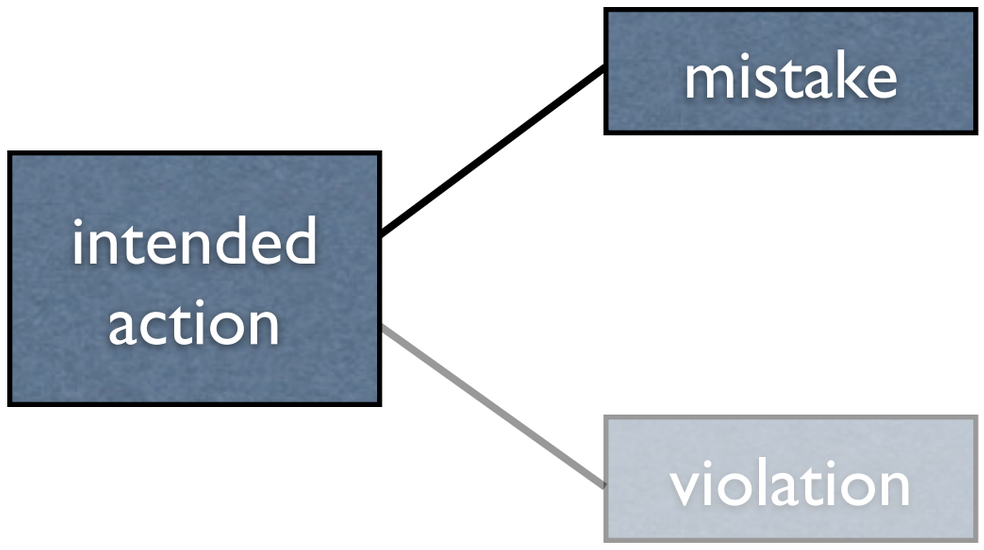


rules-based mistakes

misapplication of good rule

untested resources

no backup

application of bad rule

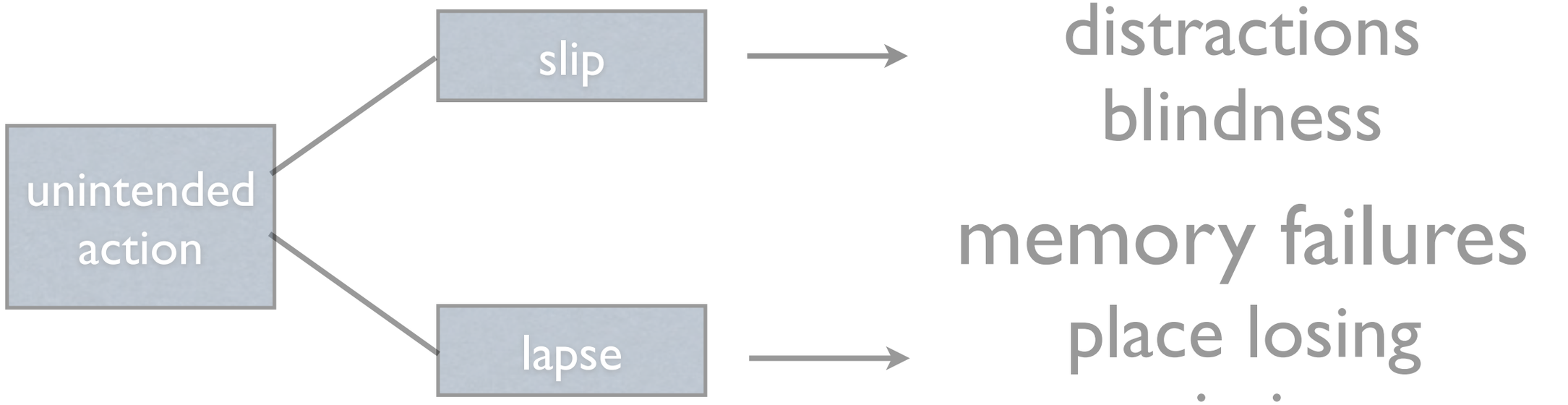
calling for help late

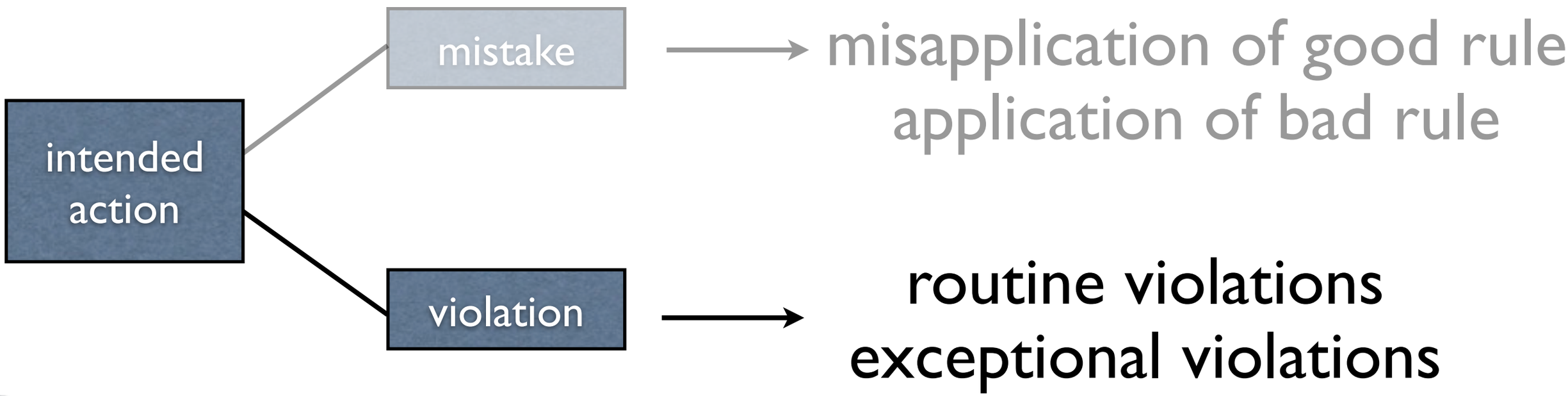
not-practiced rescue plan

travel together

(adapted from Reason, 1990)

Atkins, 2011





Atkins, 2011

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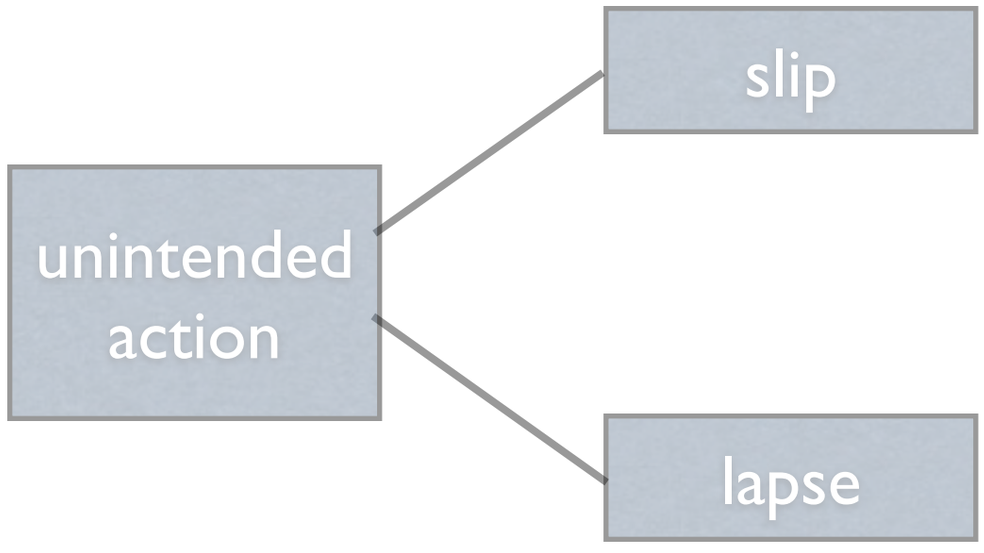


attentional failures

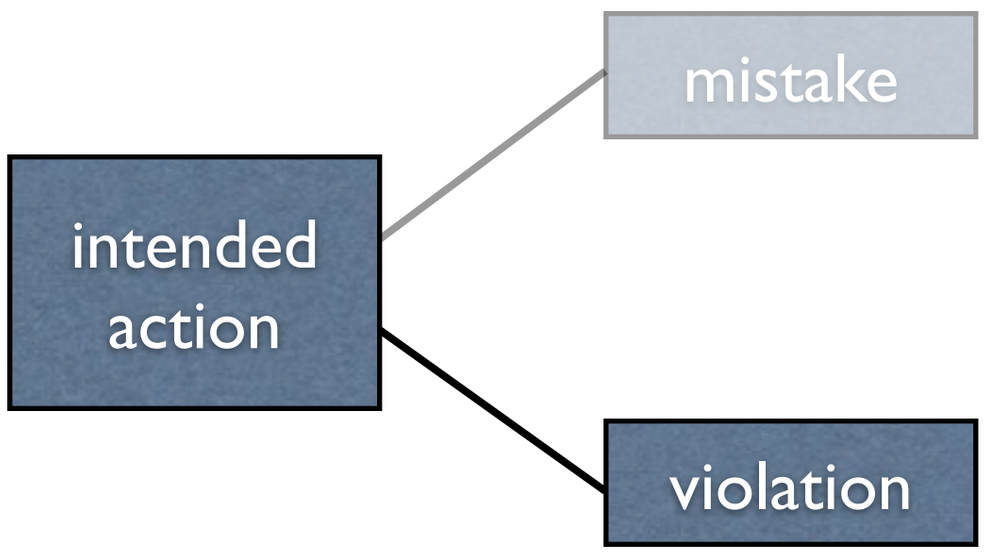
distractions

blindness

memory failures

place losing

omissions



rules-based mistakes

misapplication of good rule

application of bad rule

routine violations

travel together

weak leadership

exceptional violations

deliberate alert of wrong location

(adapted from Reason, 1990)

Atkins, 2011

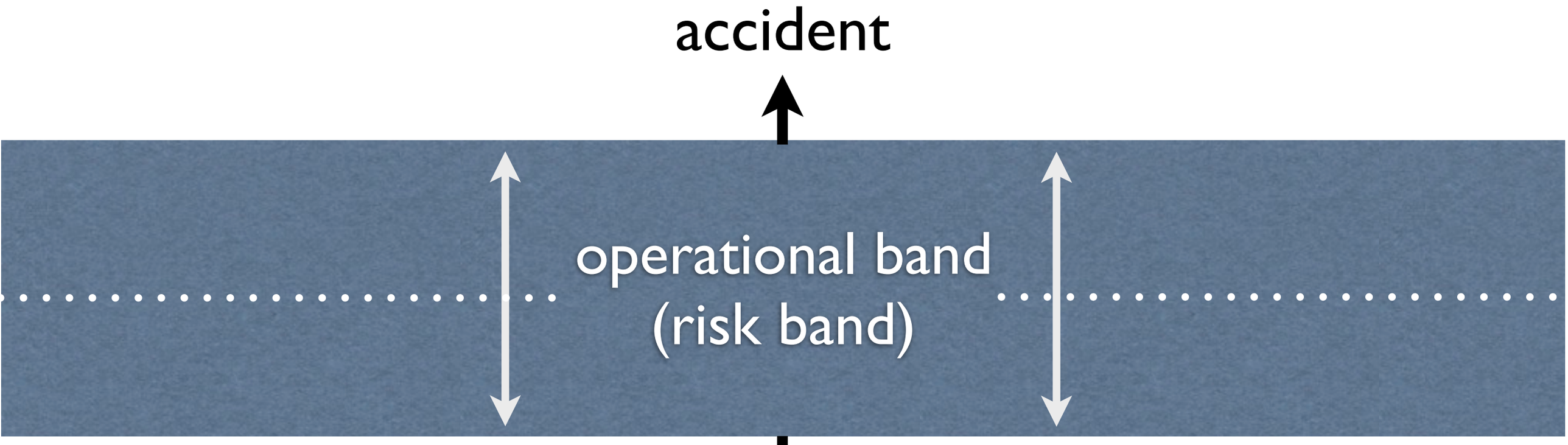
HUMAN ERROR

People are not deliberately careless.

People commit errors because they think they will not commit errors.

Atkins, 2011

WHERE ARE YOU



Atkins, 2011

(adapted from McClung, 2002)

PREVENT HUMAN ERRORS

$$R_e + M_d \rightarrow 0$$

Reduce *errors* and Manage *defenses*
to <u>prevent</u> human errors

Atkins, 2011

(Bush, 2005)

WHAT CAN YOU DO

- Implement a risk management plan for loss prevention.
- Look for "why" things happen
- ID basic error types (slips, lapses, mistakes, violations)
- Seek "how" to prevent future incidents.
- Nurture a strong "feeling of uneasiness".
- Create a culture of open communications.
- Use an *advocatus diaboli.*

Atkins, 2011

DON’T

Do not let the courts / legal system decide “why”.

Atkins, 2011