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A Poka-Yoke Primer: Mistake-Proofing and Error Reduction

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Book Giveaway Contest!

Our winners are…

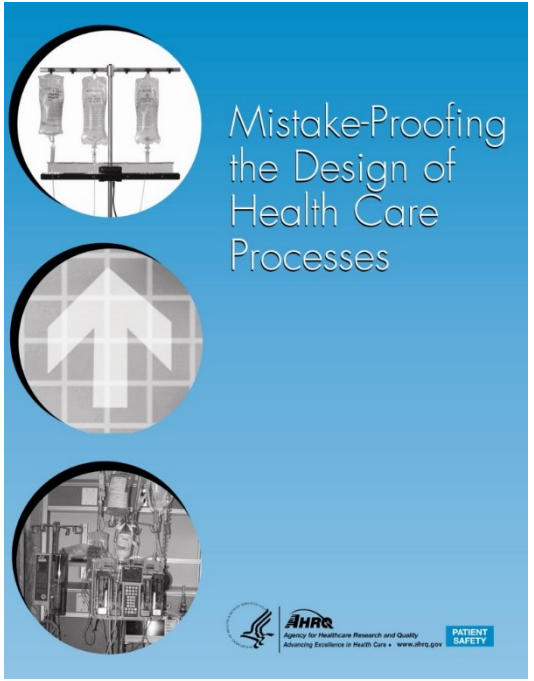
Gina Cloutier

Lisa Smith

Song Kang

About John Grout, Ph.D.

- Berry College (GA)
  - Campbell School of Business
  - Professor, former Dean
- Ph.D. Management Science
  - Penn State University
- Shingo Prize, “The Human Side of Mistake-Proofing”



Mistake-Proofing/Poka-Yoke Webinar

January 17, 2024

by John Grout

Objectives

- Build awareness of mistake-proofing
- Introduce a concise presentation format: “pecha kucha” 20 x 0:20 = 6:40
- What is mistake-proofing?
  - Include lots of examples
- Why do people err?
- How can design eliminate errors?
- Next steps in implementation

Agenda

- Introduce Pecha Kucha
- Pecha Kucha 1: Introduce mistake-proofing
- Discuss examples & answer a few questions
- Pecha Kucha 2: Which errors does mistake-proofing work on and how do I get started?
- Answer more questions about errors and mistake-proofing

Pecha Kucha (ペチャクチャ)

- Pecha Kucha was devised in 2003 by architects Astrid Klein and Mark Dytham in Tokyo, as a way to attract people to *Super Deluxe*, their experimental event space.
- Pecha Kucha is a presentations having 20 slides, each shown for exactly 20 seconds. The total presentation time was 6:40 seconds, that’s it.
- The format keeps presentations concise, fast-paced and (hopefully) entertaining.

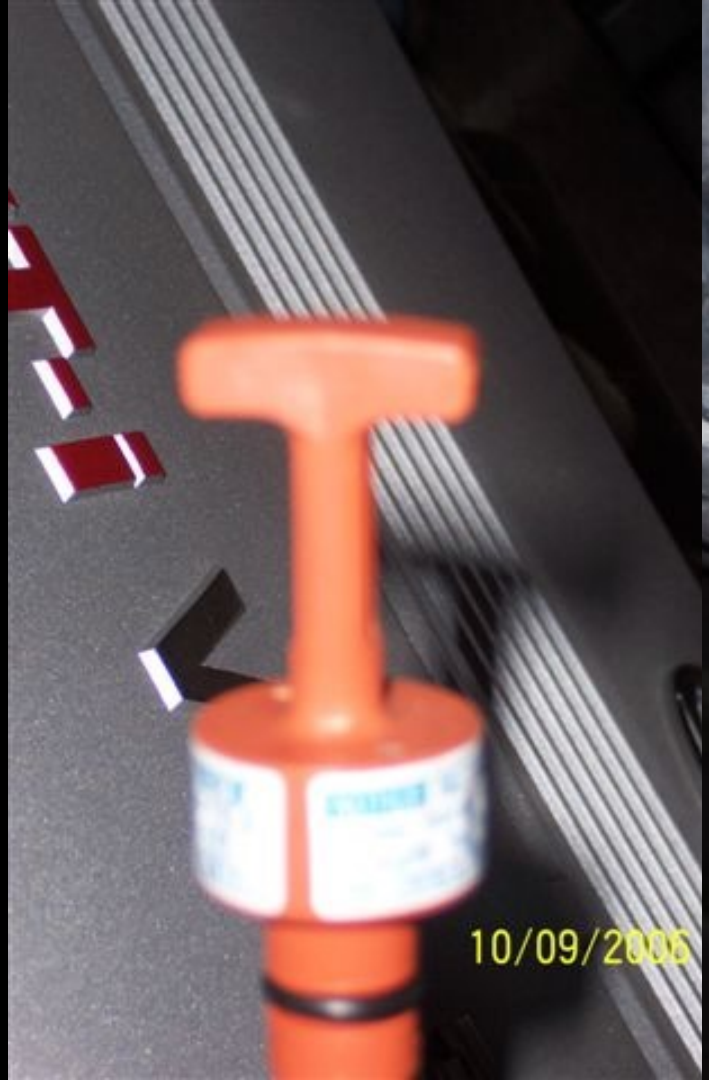
Poka-Yoke

SawStop

DRF 649

STOP
You Must Be
Under 42"
To Enter
Playtown
42"

SCHOOL BUS
SCHOOL BUS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ENGINE OIL

Get a new toothbrush

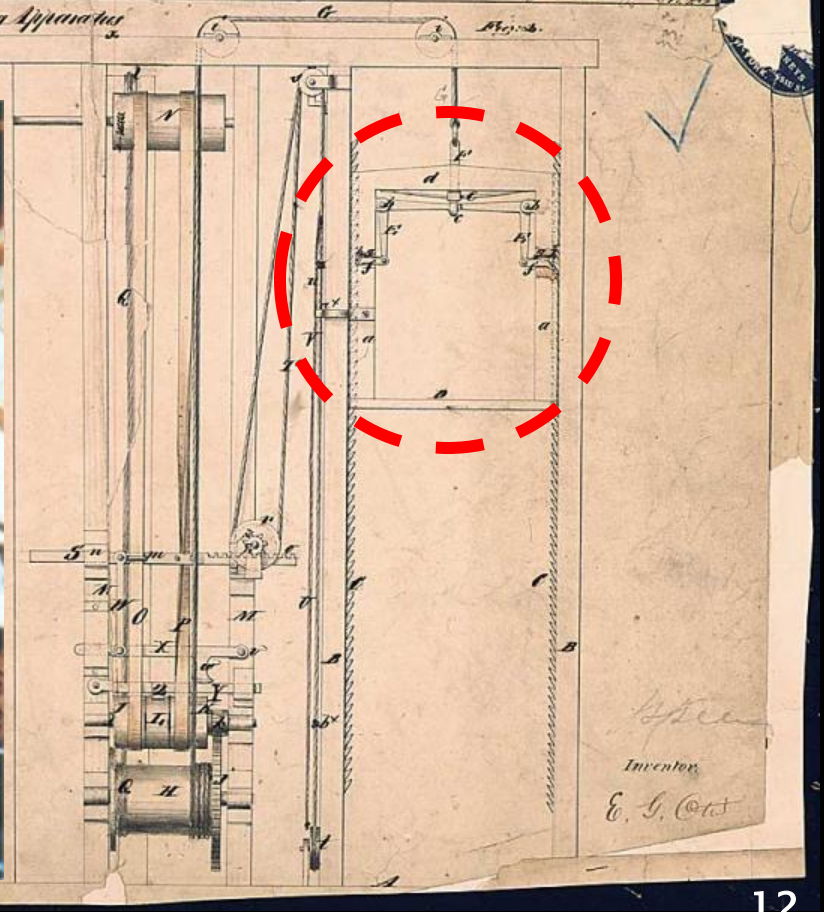
Use a metric wrench

Your syrup is hot

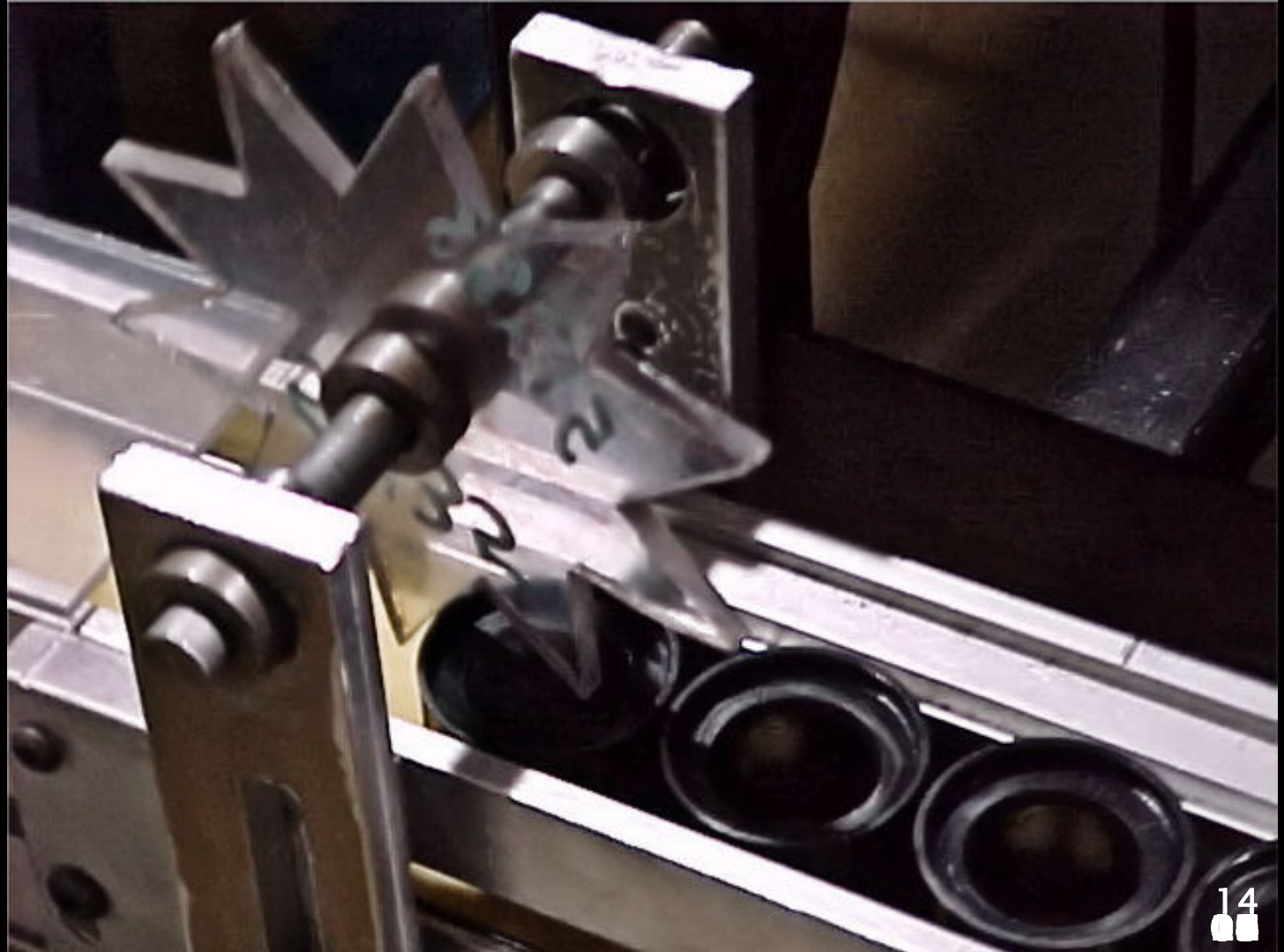
Take the elevator to X-ray

MRI is this way

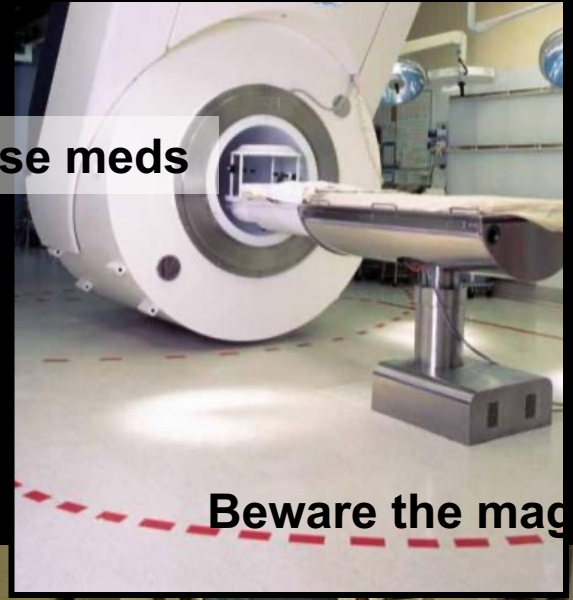
Alcatraz kitchen: The convicts are armed


E. G. Otis' Imp^d Hoisting Apparatus
Patented June 15. 1861.
Inventor
E. G. Otis

5 stories high



Leave me alone while I get these meds


Beware the mag

Wear your scrubs

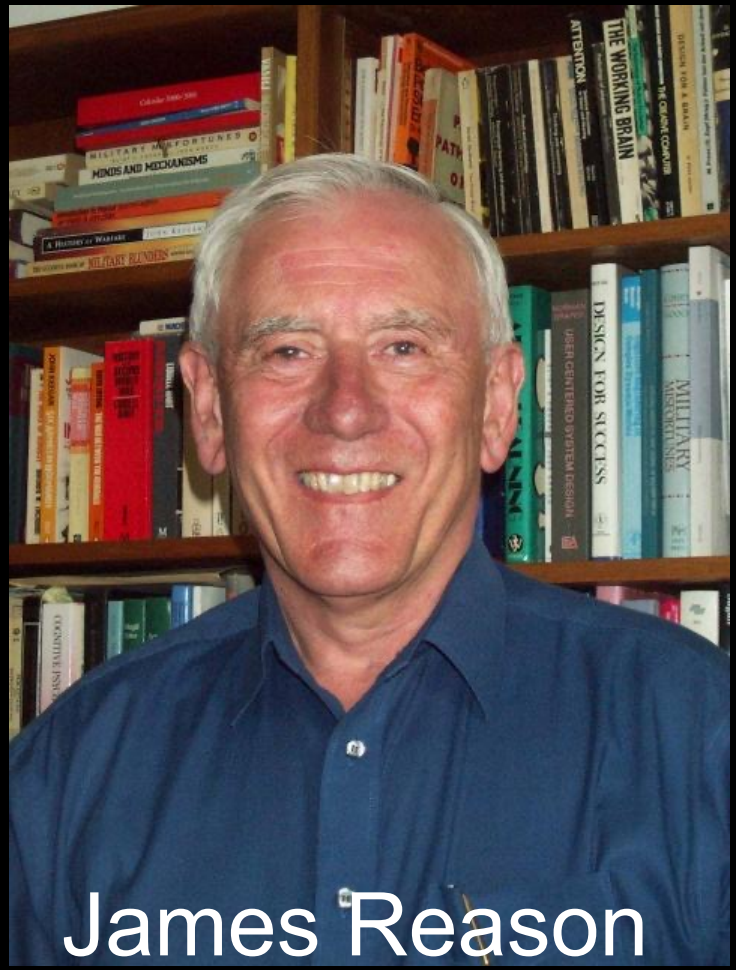
Time's up!
Any questions?

Some common mistake-proofing devices:

- **Guide Pins**
- **Blinking lights and alarms**
- **Limit switches**
- **Proximity switches**
- **Counters**
- **Checklists**

Other examples

Another Pecha Kucha is about to begin



James Reason

Intent: Help visitors find their way

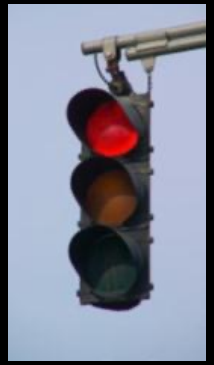
Execution: A little confusing

Skill, Rule and Knowledge-based actions

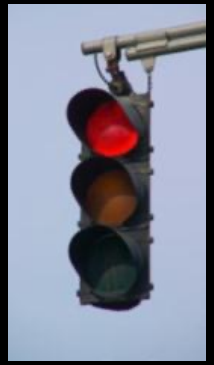
- Skill-based action: action by autopilot.
- Rule-based action: we've seen it before and recall a rule about what action is appropriate.
- Knowledge-based action: Truly novel circumstances require careful thought and deliberation about what to do.

Rule-based action

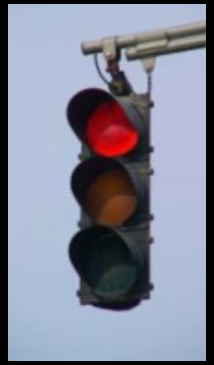
Knowledge-based action



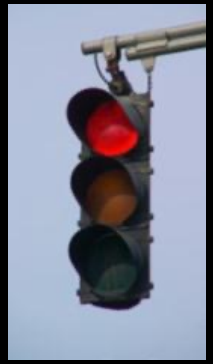
1 minute



2 minutes

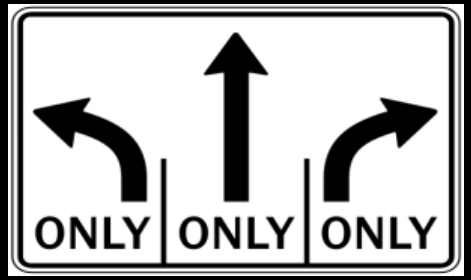


3 minutes

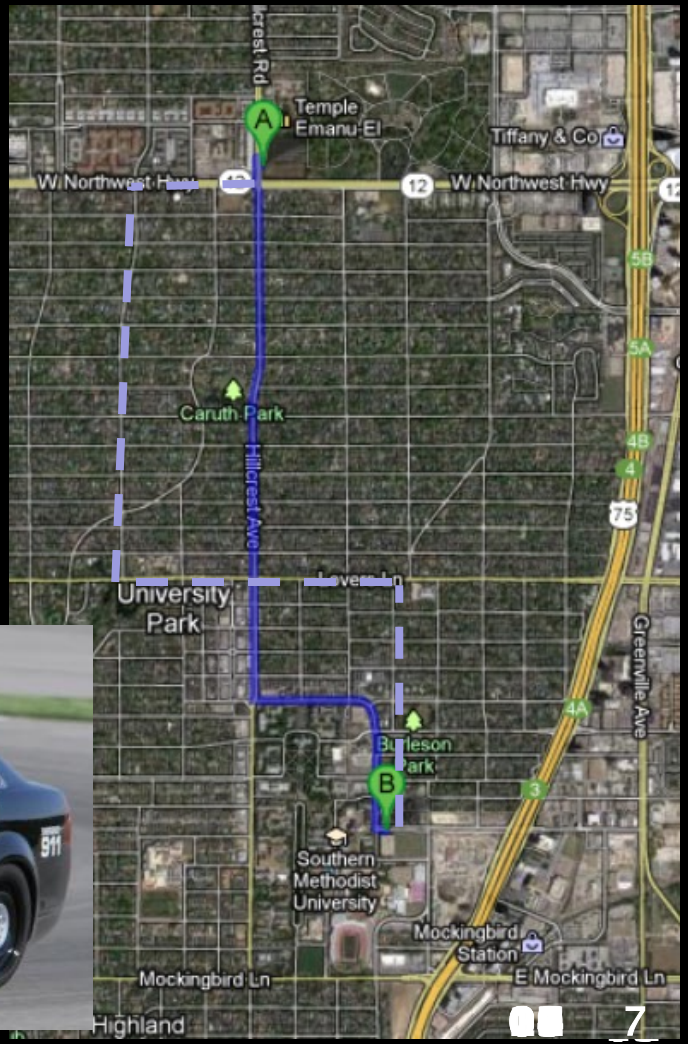


4 minutes

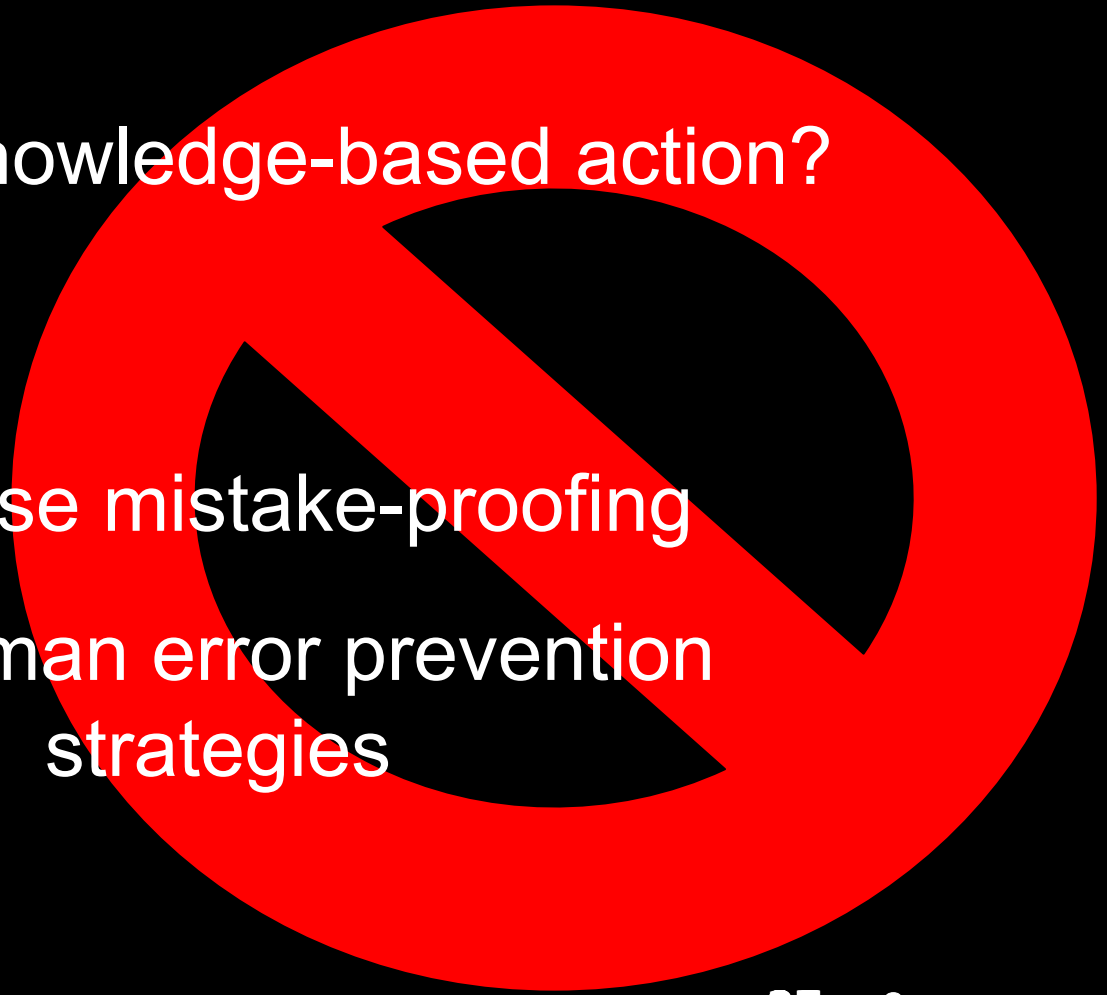
5 minutes



POLICE
911


Hillcrest Rd
Temple Emanu-El
Tiffany & Co
W Northwest Hwy
12
Caruth Park
Hillcrest Ave
University Park
Greenville Ave
Southern Methodist University
Mockingbird Station
Mockingbird Ln
E Mockingbird Ln
Highland
A
B
75

Errors in knowledge-based action?



Don’t use mistake-proofing

Use human error prevention strategies

Errors in rule-based action?

Mistake-proofing may work well

Combine with human error prevention strategies

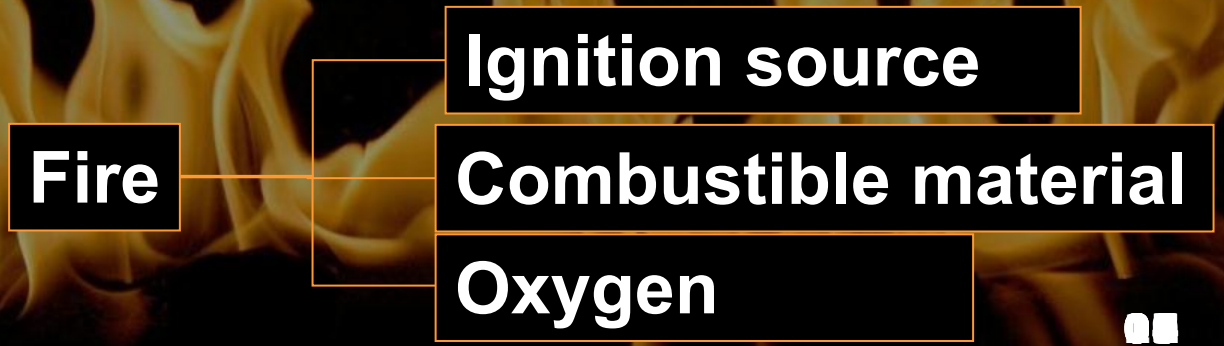
Errors in skill-based action?

Mistake-proofing is ideal

Perhaps best human error prevention strategy for these actions

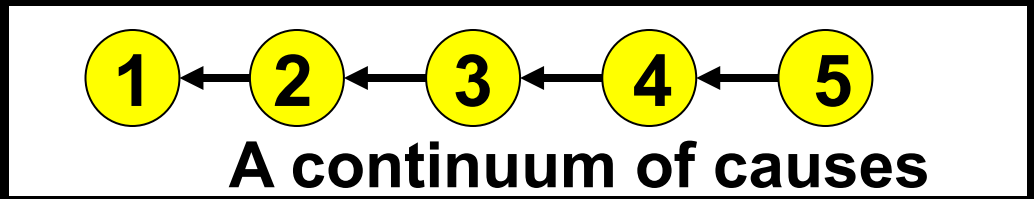
Root Cause Analysis

- Root Cause: a cause that can be acted upon such that it meets our goals and objectives and is within our control
- Look for actions AND conditions



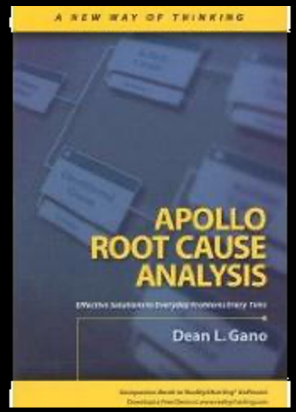
Cause and effect are same thing

Effects	Caused by	Causes
1. Injury	→	Fall
2. Fall	→	Wet surface
3. Wet surface	→	Leaky valve
4. Leaky valve	→	Seal failure
5. Seal failure	→	Not maintained



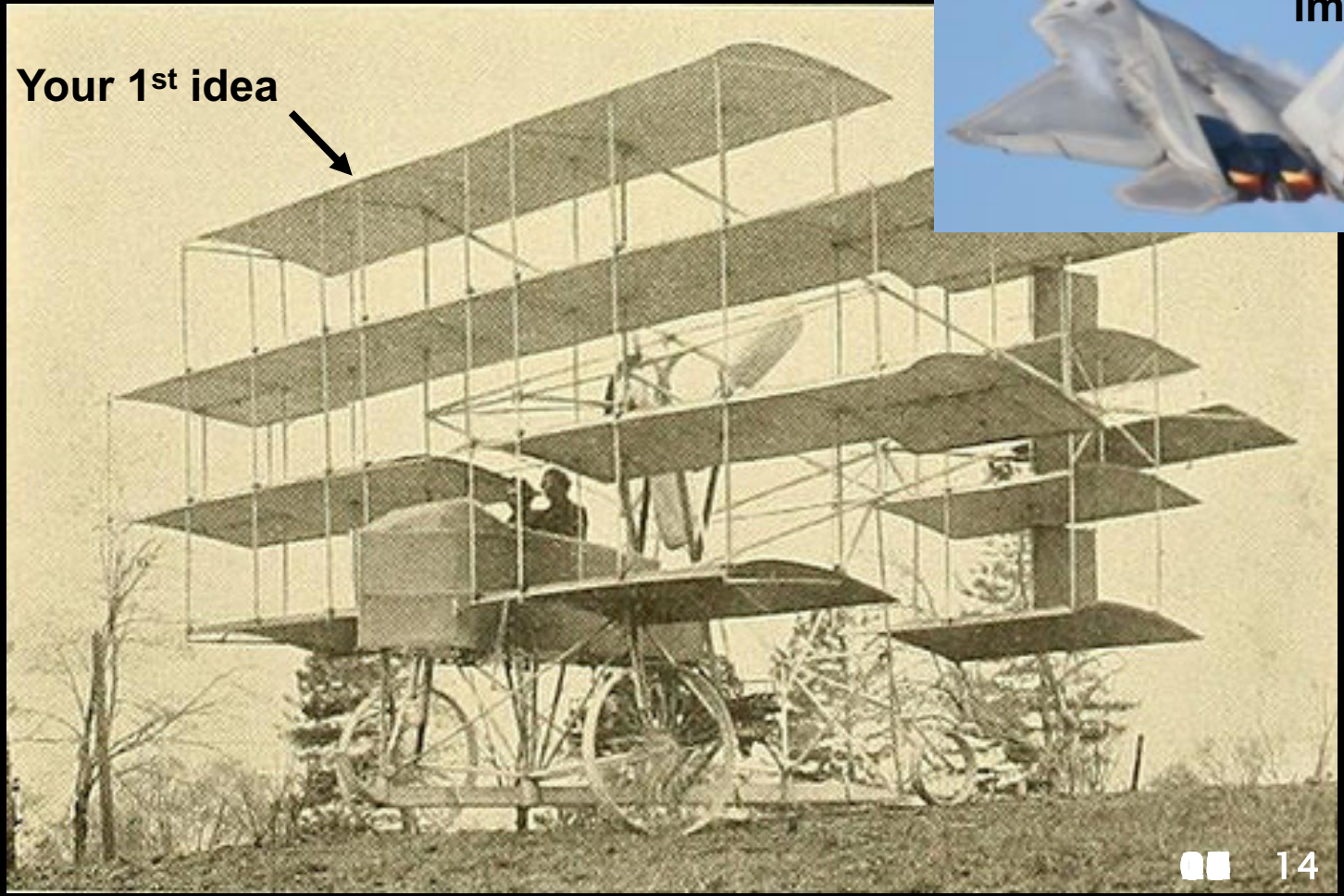
Cause and effect are same thing

- Toyota says ask why 5 times
- If it's a continuum, why not more?
- Keep going until your answer to why is:
  - I don't know
  - I don't care



Apollo Root Cause Analysis: A New Way of Thinking
by Dean L. Gano

2. Start brainstorming solutions



2. Start brainstorming solutions

Try-storming (w/full-sized cardboard mock-ups)

3. Learn quickly which ideas are mistakes

Boeing Moonshine Shop

- No Money Spent = Creativity at a New Level
- Scrounge for EVERYTHING! EVERYWHERE!
- Fast and Inexpensive is the ONLY way to Try-Storm
- A 50% solution actually implemented, beats all hell out of a 100% perfect plan, created by meetings
- Get out of Kansas! To think differently you have to see and try different things – LEAVE YOUR WORKSITE! *Frequently*

3. Learn quickly which ideas are mistakes

Day 1: Lots of mock-ups

Day 1.5: discard some ideas
consolidate others

Day 2: proof of concept

Day 5: Finished tool

Day 2.75: prototype

Position Airplane Here
Load Seats Here

Mistake-Proofing: When and How

Knowledge-based action?

Rule-based action? ☑

Skill-based action?” ☑

1. Find the root cause
2. Try-storm prevention strategies
3. Fail quickly and cheaply to find success

Time's up!

Any questions?

Design (& details) still matters

It's there…

But can you see it in use?

Your errors

- What were they?
- Were they skill-, rule-, or knowledge-based?
- Any thoughts about how to prevent them?
  - Make the error more obvious
  - Create a failure that makes the error more benign
  - Help people do things right by putting knowledge in the world

A proposal for action: Homework

- Do something meaningful
  - Eliminate an error by mistake-proofing
  - Create significant cost savings
- Do something you'll be proud of
- Do something cool
  - Brew some moonshine: do something with nothing

Thank you!

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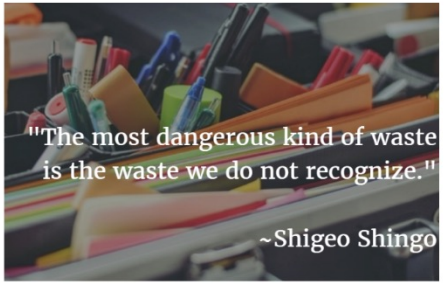

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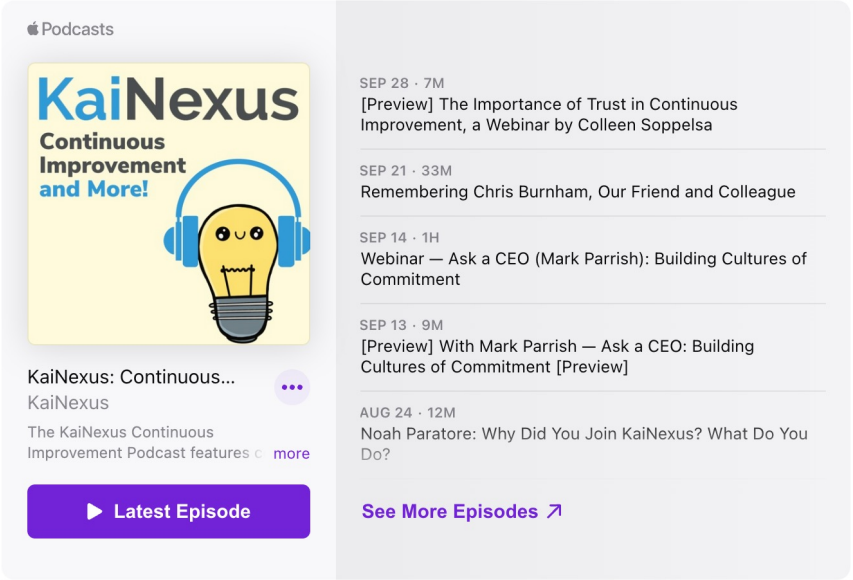

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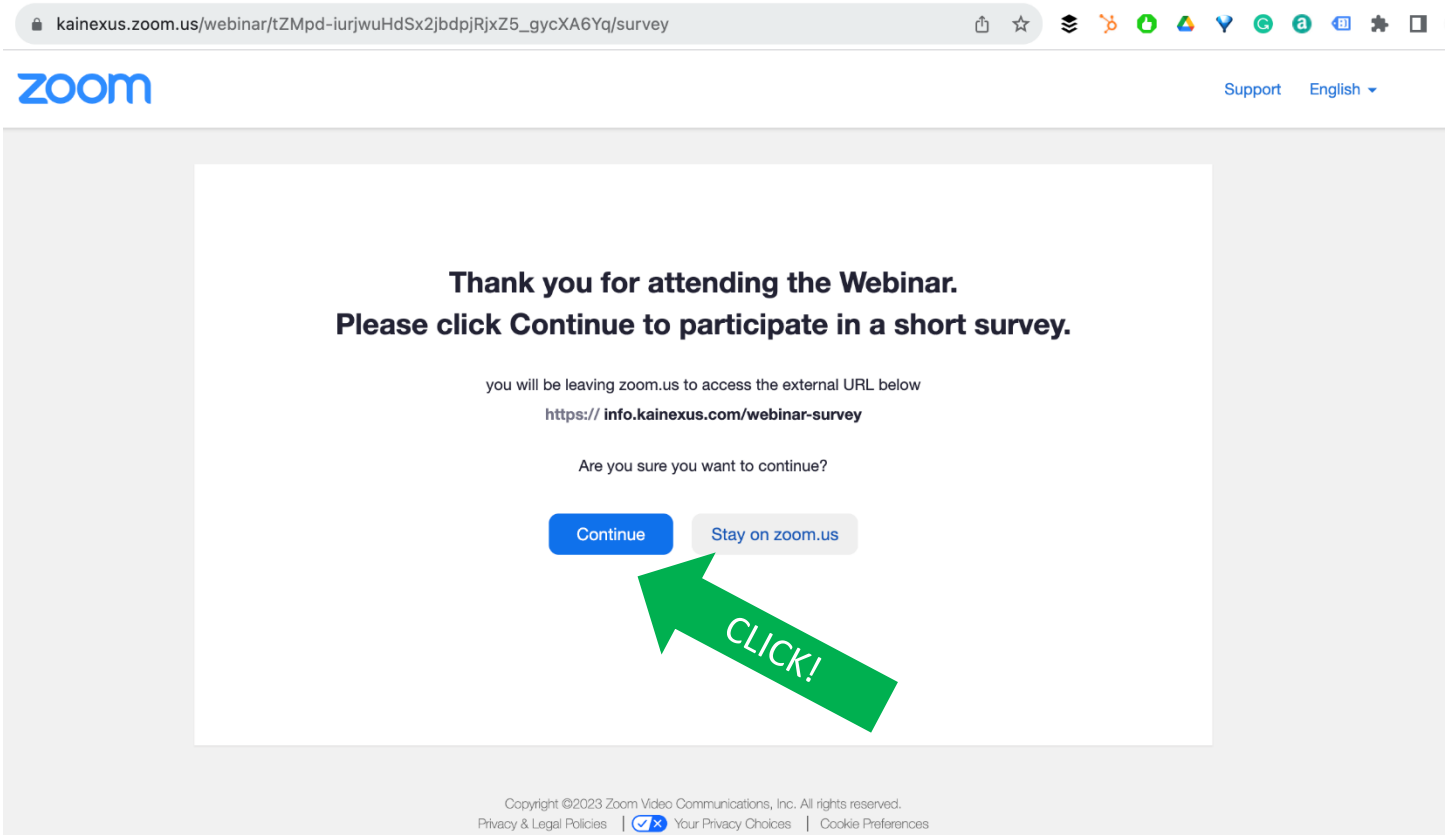

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