

2017 SMA Safety Summit

A Safety Philosophy

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A Safety Discussion

Discussion Outline

- I like metaphors
 - Introduce a metaphor
 - Talk about the metaphor



United States of America
Historic Route 66

THE RACE



The Race

Route 66

- Historic Route 66 is sometimes also referred to as the devil's highway
- Is >2000 miles long
- Possesses a quickly changing landscape and some harsh climates to drive through in summer
- Perfect for our race



The Race

Rules of the Race

- Rules of the race
 - Must stay on Historic Route 66
 - The race will take place in summer – starting July 5th
 - One full size spare tire available
 - Can only go +5mph over speed limit unless passing – allowed to pass at +20 mph
 - Can only drive 8 hours per day – stops and rest not included.
 - Get to bring along a mechanic – who can pack spare parts to bring along for the trip.



The Race

Contestant #1

- Jacques Villeneuve - 45 yrs old
- Winner of the 1995 CART Championship, 1997 Indy 500, and the 1997 Formula 1 World Championships
- Has driven Route 66 five times in his lifetime



Pharmacy

His Car



The Race

1979 Ford Pinto

- 200,000 miles on it
- Last service was 6 months ago
- Left front tire has minimal tread left
- Brakes are OK, but left brake light is out
- Cooling pump has been making noise lately and plugs haven't been done in the last 100,000 miles
- No A/C, and instrument cluster has been glitching (fuel level & thermostat)
- Front windshield has spider webbed crack on the passenger's side
- Has been going through a litre of oil every 300 miles or so.



The Race

Contestant #2

- Helen Mirren – Age 71
- Began her acting career with the Royal Shakespeare Company in 1967
- Will be in Fast & Furious 8



Her Car



The Race

2001 Toyota Camry

- 140,000 miles on it
- LE 4-cylinder model with air, cruise, etc.
- Last service was 3 months ago at dealership
- New front tires 2 years ago, wheel alignment and balancing completed at the time.
- Has been running well for the last number of years with minimal maintenance required.
- Exterior and interior showing typical wear and tear expected for this age of the car.
- Wipers haven't been replaced lately and the left wiper isn't working that well.



United States of America Historic Route 66



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Day 1 - Jacques

Daylight for 15 hours starting at 5 AM
Sunny, 28°C, light winds



- Jacques puts in 8 hours of driving time
- Found it a little difficult to pass in congested areas due to the lack of acceleration available
- Stopped 2 times for fuel as the intermittent fuel gauge was difficult to manage – didn't want to run out of gas. Topped up oil at each gas stop.
- Close call in St. Louis when he had to brake hard and person lane changing from the lane right of him couldn't tell he was braking. Evasive maneuvers – no problem.
- Avg speed limit – 45 mph. Avg speed 50mph. Distance = 400 miles
- A solid day's work



Day 1 - Helen

Daylight for 15 hours starting at 5 AM
Sunny, 28°C, light winds

- Helen puts in 7.5 hours of driving time
- Long line at starbucks – little later start
- Stopped 1 time for fuel
- Stayed in the right lane for the most part – caught in traffic a couple of times
- Little bit of stop and go traffic with a few aggressive stops required. ABS came in handy once.
- Avg speed limit – 45 mph. Avg speed 48 mph. Distance = 360 miles
- Trailing Jacques by 40 miles.



Day 2 - Jacques

Daylight for 15 hours starting at 5 AM
Thunderstorms in the afternoon



- Before starting out, Jacques does a once over of his car – looks good.
- No real major incidents during the day.
- Little dicey during the afternoon thundershower, as car was wanting to hydroplane, but this is Jacques Villeneuve – no problem.
- Avg speed limit – 45 mph. Avg speed 50mph. Distance = 400 miles again
- He's a racecar driver – he knows how to optimize every bit of mileage.



Day 2 - Helen

Daylight for 15 hours starting at 5 AM
Thunderstorms in the afternoon

- Helen needed another Starbucks
- Good driving day for Helen as well.
- Left wiper was an issue during thunderstorm – pulled over to have mechanic change wiper.
- Avg speed limit – 45 mph. Avg speed 49mph. Distance = 392 miles
- Still getting the hang of topping out the mileage for the 8 hr driving period.
- Helen is behind by 48 miles so far.



Day 3 - Jacques

Daylight for 15 hours starting at 5 AM
Scorcher: +41°C expected



- Before starting out, Jacques does a once over of his car – looks good.
- No A/C – Jacques was pretty uncomfortable on this leg, especially when caught in the traffic jam by Amarillo, TX – cattle crossings can take some time.
- Started early to get ahead of the hot weather but car overheated 100 miles East of Albuquerque near the end of the day's leg, stopping him at 360 miles for the day.
- Mechanic was ready for this as he knew the cooling pump could be an issue on the trip. Had a spare with him and all the tools for the job. Changed out that evening and ready to go for the next day.
- Jacques goes to Walmart and buys a flat of Gatorade – lost a lot of fluids that day.



Day 3 - Helen

Daylight for 15 hours starting at 5 AM
Scorcher: +41°C expected



- Helen knows the forecast and heads out early
- Pretty hot out and can notice the A/C struggling to keep up but overall the cabin was decent.
- Accidentally ran over an armadillo near Amarillo. Blew out the front tire and ended up heading for the ditch, plowing into a cactus grove. Air bags deployed but Helen and her mechanic were OK.
- Mechanic changed the tire. Took some time to get out of the grove but they got back on the highway and carried on.
- 392 miles for the day – 16 miles behind Jacques.



Day 4 - Jacques

Daylight for 15 hours starting at 5 AM
Another scorcher: +38°C expected



- Jacques has his mechanic look over the cooling system one more time.
- Mechanic paying more attention to the car. They stop frequently to look for issues as car seems to be running a little hot still. Oil topped up as needed every gas fill.
- No A/C – again!!! Goodbye flat of Gatorade.
- Jacques and his mechanic make a good tag team this day. Coaxing his car through the desert in prep for one of the most grueling parts of the journey.
- They make it to Flagstaff, AZ. 370 miles on the day. 440 miles left
- Side note – Jacques breaks out his “Serenity now” self help cassettes to manage the heat (via 8-track adapter, of course)



Day 4 - Helen

Daylight for 15 hours starting at 5 AM
Another scorcher: +38°C expected



- Helen notes that the steering is a bit off first thing. Remnants from the incident with the armadillo, no doubt.
- Has her mechanic spend the morning fixing that up then gets this leg underway.
- A/C managing a bit better today.
- Also makes it to Flagstaff and runs into Jacques at the local pub. The two share stories about their journey.
- Both know that the race can be finished by end of the next day so it gets a little competitive.



Final Day!!!

Daylight for 15 hours starting at 5 AM
All kinds of weather expected due to the terrain

The final stretch is through Sitgreaves Pass with many
Hairpin curves and narrow turns

- Helen and Jacques have a rough start, but it's game on
- **Surprisingly**, the two make it through the harrowing barren mountain stretch without incident. Both cars hold up OK – unexpectedly for Jacques.
- This brings them neck and neck into the outskirts of LA. Helen stays on Jacques bumper the whole way knowing he will guide her through
- However, in the end this is where Jacques shines. He's an F1 racer and traffic is his game, and ultimately





Jacques wins!!!



The Race

Why did Jacques win?

- Better driver with more experience – definitely more skilled.
- More prepared, can read traffic better.
- Had a little bit of luck on his side, knew the limitations of his car better
- Maybe there are lots of other reasons . . .



The Race

Why didn't Helen win?

- It's my metaphor, so
- Maybe she isn't as experienced
- Maybe she wasn't aggressive enough
- Maybe circumstances were against her
- She definitely isn't as skilled at racing



The Race

A different perspective

- What would happen if we did the race again – would Jacques win?
- What about 50 more times?
- What if we looked at it in a broader sense, factoring in probabilities of circumstances, reliability, human error – then what?
- Who would consistently win the race and why?
- Who would encounter fewer risks?



The Race

What is the feeling you have about which driver had the “safer” journey?

- “Safer” – what does that mean?
- Circumstantially, there were lots of internal and external factors influencing the racer’s safety.
- However . . . whose car would you rather drive?
- Why would you feel “safer”?



The Race

What is the difference between the cars?

- Tires were better
- Was in a better state of repair
- Had more features that made Helen's driving experience better (A/C, cruise)
- Newer ... fewer miles . . . sure, but what does that mean? What if the pinto was completely rebuilt with new, original components – would it be safer?



The Race

What is the *real* difference between the cars?

- The intrinsic nature of a 2001 Toyota represents “safety” far better than a 1979 Pinto.
 - Reliability
 - Safety features: air bags, seat restraints, traction control, anti-lock brakes
 - Better suspension and handling
 - Components are better designed – less need for repairs
 - More feedback to the driver – sensors, instrument readings, etc.
 - Improved ergonomics leading to more focus on the road

 - Safety through design

 - One more thing - it doesn't explode in the wrong set of circumstances



The Race

What about the human element of this race?

- Even though Jacques would be more in tune with driving his car, he was still at more risk than Helen because of his car.
- In reality, Jacques isn't in control of everything and only possesses partial power to reduce his injuries.
- There are operating conditions that will arise, out of Jacques' direct control, that he will be required to respond to.
 - other drivers
 - road conditions & weather
 - vehicle capabilities
 - vehicle failure
 - not to mention the ticking time bomb that is part of the intrinsic design of his vehicle.



Safety Philosophy??



Safety Philosophy

$$\text{Safety} \propto \frac{1}{\text{Exposures}}$$



Eliminate Exposures through “Systemic Safety”

- What is Systemic Safety?

Intentional creation of an intrinsically safe operating environment by anticipating and minimizing exposure risks through a systematic strategy.



Elimination through Systemic Safety

Achieved by reducing exposures through . . .

1. Design
2. Operating controls
3. Maintenance controls
4. Management processes



Elimination through “Systemic Safety”

- What is Systemic Safety?

Intentional creation of an intrinsically safe operating environment by anticipating and minimizing exposure risks through a systematic strategy.

Design, Control, Maintain, Manage



Back to the Race

Final question

What kind of “car” do you drive?



Back to the Race

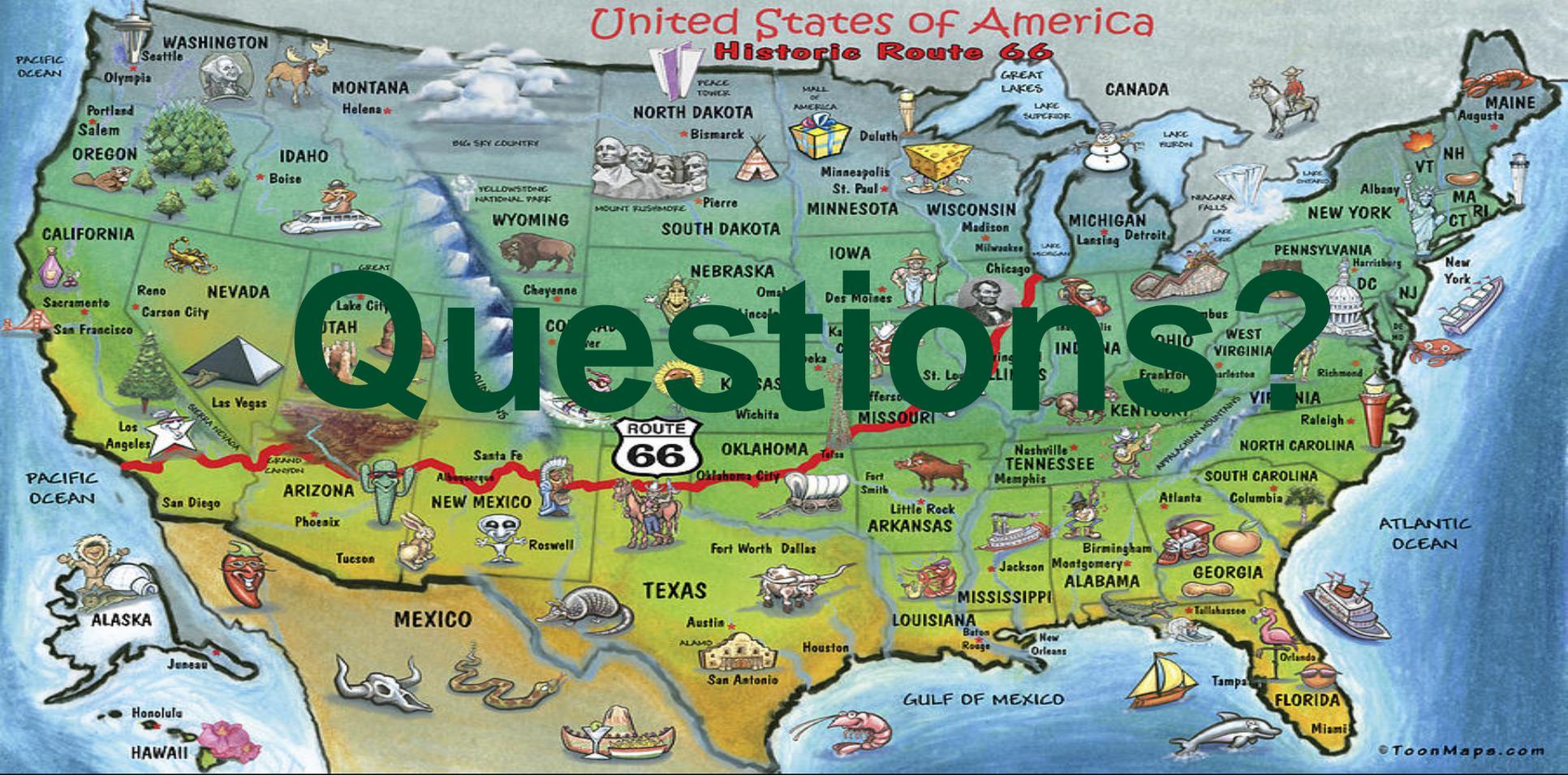
Better yet . . .

What if Jacques drove Helen's car?



United States of America Historic Route 66

Questions?



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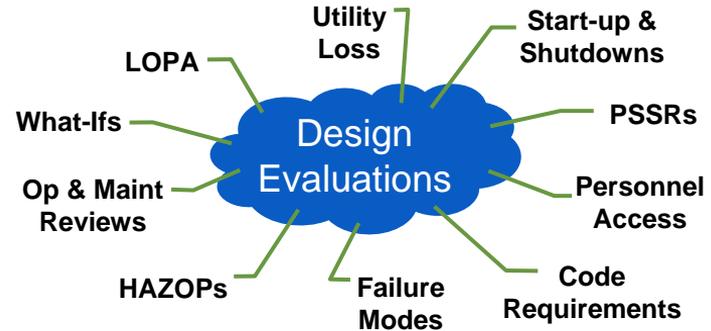
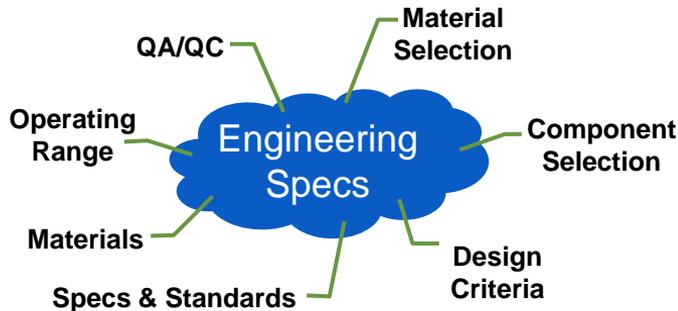
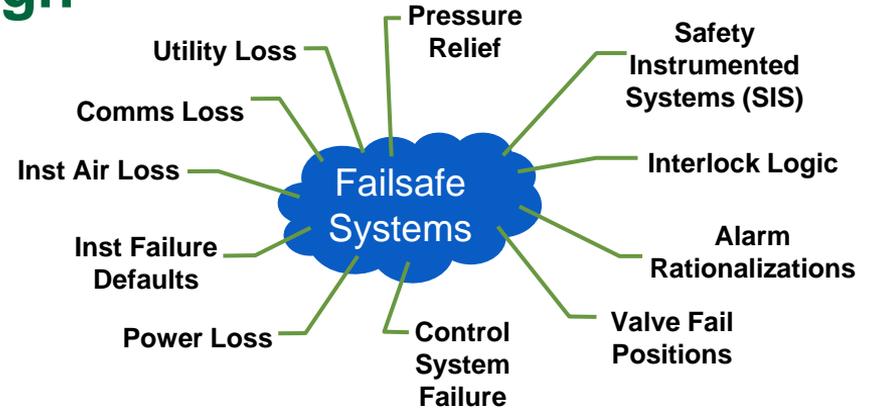
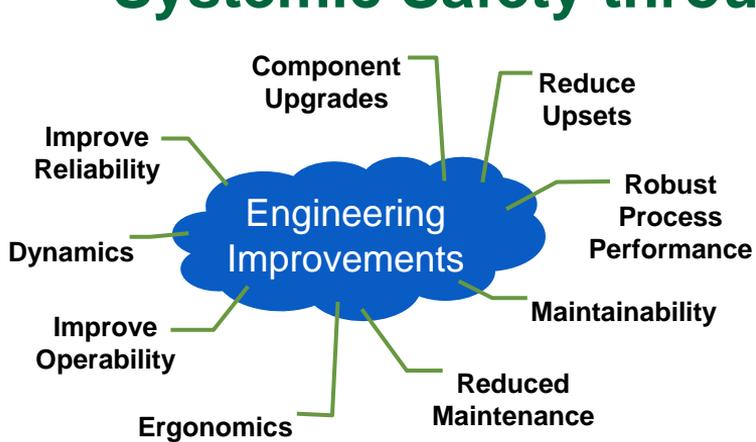
Elimination through Systemic Safety

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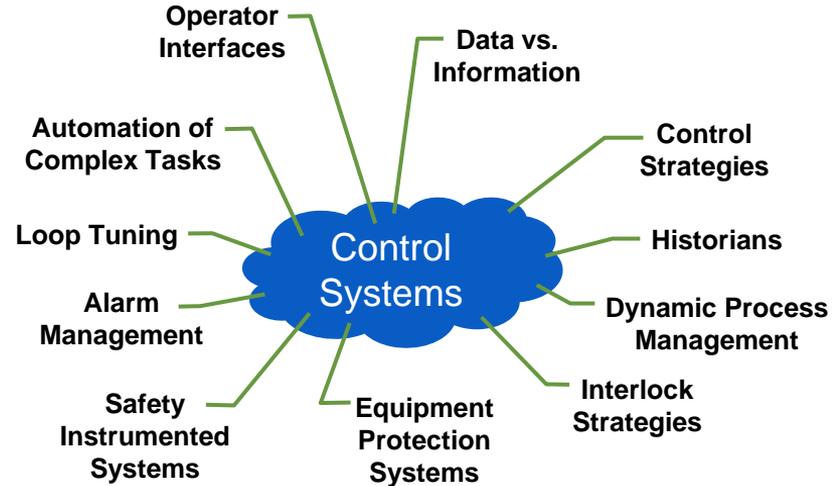
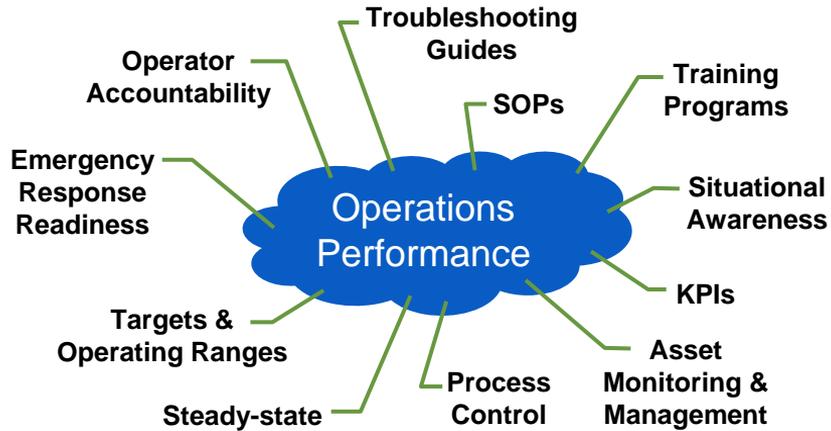
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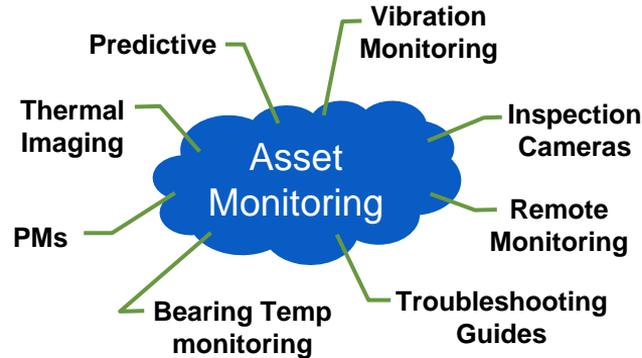
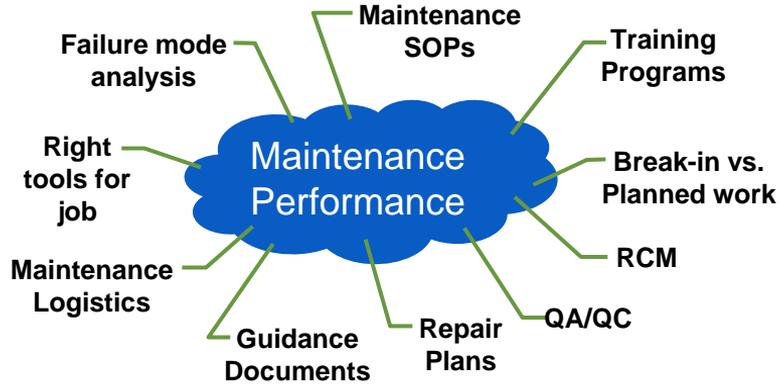
Systemic Safety through Design



Systemic Safety through Operating Controls



Systemic Safety through Maintenance Controls



Systemic Safety through Management Processes

