Selling Safety

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Outline

- Premise: Safety is typically presented as negative.
  - How the safety profession has been damaged by misperception.
- Thesis: Safety, correctly presented, is positive.
  - Positive examples of the safety profession.
- Synthesis: Safety Engineering enhances quality of life for all.
  - How to “sell” safety to: Lawyers, Scholars, Sporty People, Program Managers, and (Non-Safety) Engineers.
  - Additional ideas on improving the profession’s image.

Premise:

Safety

as typically presented

has negative connotations

“Safety” seems Negative:

- Safety Engineering is typically presented in a negative context, as in:
  - Safety Engineers are the people who use statistics, logic and analysis (paperwork) to reduce the probability that the system under study will cause death, dismemberment and/or destruction of property.

Lies, Damned Lies, and Statistics*

- “Safety” has an unfortunate entanglement with statistics as a method of expression:
  - 2.39×10^{-7} failures/hour??
- 175 Lbs, 525 horsepower, 17,000 mph orbital velocity, these numbers people can understand and relate to.
  - Things are either OK or broken.
  - Tiny fractions of a failure per hour are not.

(*Mark Twain)

“Safety” seems Negative:

- “Safety Scissors” in kindergarten
  - Surpassed only by “left handed safety scissors” in frustrating children's ability to create paper crafts

- “Safety Seats” for kids in cars, restaurants, and shopping carts.
  - Frustrating for children, parents, and everyone else in the place. (and they still manage to wiggle out and land on their heads).

Negative Safety Associations:

- OSHA - Occupational Safety & Health Administration

- TSA - Transportation Security Administration

Forbidding Jargon

The language of safety is filled with mystic, negative images, and obscure jargon:

- **Probability of Failure (Pf)**
- **Low probability of Failure**
- **Hazard Effects**
- **Catastrophic**
- **Fatalities**
- **Injury**
- **As Low As Reasonably Practical (ALARP)**

Inverted Concepts

Safety is measured by failure:

- Probability of Failure (Pf)
- 2.39×10^{-7} failures/hour
- A successful safety program is one that finds multiple design flaws that can kill people??

Confused Language:

- Functional Hazard Analysis (FHA):
  - Analysis of
  - The hazards of
  - Functional(s), (whatever it is?, (they are?))
- So the hazard of the functional is analyzed for?
- Or the Functional Hazard is analyzed, to get what?

Confused Language:

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Inverted Logic

- Fault Tree Analysis (FTA): Successful achievement of the top item on the chart results in the hazardous effect (catastrophe, disaster, etc.)

(Hooray??)

Relative Safety

- Safety can never be perfect.
  - Safe Enough is a reasonable goal.
  - Safer than Safe Enough is unreasonable.
  - Safer than that is even better?!?

Safety Frustration

- Safety can never be perfect:
  - Statistical approximation is required.

- Actual Achieved Safety cannot be measured before products are released:
  - Safety engineers cannot be certain how valuable their contribution is until the product fails, or fails to fail, or …

Safety Engineering is boring

- Safety is presented as a paper shuffling and number crunching task, with no immediate impact on the design.
- Safety is always the last presentation on the last day of the design review!
- Little wonder that few engineers start their careers lusting for a chance to become:
  . “The Safety Person”.

Misuse of Safety Engineering

- The practice of calling on the “Safety Person” to sprinkle “holy water” on the design after the design is “cast in concrete” leads to:
  - Late discovery of complex interactions, hidden flaws, etc. requiring higher administrative involvement, and decision to fix or ship as is.
  - Or worse: incomplete, inaccurate safety analysis and assessments, leading to distribution of products with unknown defects.

NTSB is cool, Safety Engineering not

- NTSB deals with the effects of hazards. Death, destruction, losses.
- Safety engineers fix potential hazards before they happen, with engineering paperwork.
- People are excited by tragedy, not paperwork, no matter how significant the benefit to society.
- So, how can ISSS become cool?

Thesis:

Safety,
correctly presented,
is positive.

Thesis: Safety is positive

- The “gold standard” for safety is:

  “As safe as a babe in its mothers arms.”

Positive Safety

- Context matters: “A babe in its mothers arms”
  - Not *very safe* in a moving car.
  - But great in a rocking chair.

Positive Safety

- Safety Engineers identify the non-obvious, chained cases, improving outcomes.

Synthesis:

Safety Engineering

is a

Life Enrichment Activity

Which is more persuasive?

Safety Engineering *promotes* “health and survival”.

or

Safety Engineering *prevents* “death and destruction”.

Which is more persuasive?

- Design Assurance Level
  - Implies positive outcomes
- Level of Rigor
  - Implies hard work

Safety Engineering as a Life Enrichment Activity

- Including safety in the early design process results in products that are:
  - More reliable
  - Easier to understand, and operate
  - More fun to use
  - Provide new experiences, information, and adventure

Safety Engineering Enriches:

Lawyers

Scholars

Sports-Persons

Program Managers

(Non-Safety) Engineers

Safety Enriches Lawyers Lives:

Safety Engineers help to :

- Affix blame in an injury law suit so your client is willing to pay you a large fee.
- Avoid blame in an injury law suit so your client is willing to pay you a large fee.

Lawyers benefit from safe products:

Healthy, happy customers use lawyers to:

- protect intellectual property.

Safety for Young Scholars

- Provide educational material to present safety in a positive light.
- Much visibility, low cost, make safety a contest, and fun.

Safety for Young Scholars

- Well designed tools for use by youth can improve their construction projects, and reduce their frustration levels.

- Need: Pictures of children/teens making things with 3-D printers (e.g. RepRap), Laser cutters, and scissors that work!

Safety for Young Scholars

- Well designed tools for use by youth:
  - “Safe” tools includes things like scissors, knives, and saws that actually work.

Safety for Young Scholars

- Well designed study tools improve research accuracy, improve experimental success.
- Safety gear improves success rates in reading, writing, and math, by keeping brains intact.
- Need: Pictures of walking on a well designed sidewalk, riding motorcycles, horses, chemistry lab, machine shop, etc.

… a well designed sidewalk …

Is fairly boring,

But:

- with the right backdrop
- and interesting subjects in the foreground,
- the sidewalk can be shown
- as the potential killer it is!

Safety for Sports

- Helmets keep the brains intact when riding bikes, climbing, or jumping off bridges.
- Pads & Gloves prevent bruises & abrasions.

[Need: Pictures of trail bikers, rappelling, bungee jumpers, Judo throw]

Safety: We think about it before you do!

The International Systems Safety Society

Safety for Program Managers

Safety Engineers contribute to program success

- Identify optimal resource allocations
  - Fewer spares
  - Higher availability
  - Fewer and less expensive repairs
  - Effective, accurate user/maintainer training
- Result: on time and under budget program.

Safety for (Non-Safety) Engineers.

- Early inclusion of safety engineering identifies and corrects “hidden”, non-obvious, chained, compound, interactive, unacceptable safety cases before the design is “cast in concrete”.

Safety for (Non-Safety) Engineers.

- Realignment of resources early can achieve success.
  - (a late discovery may not.)
- Safety is about getting it right,
  - so you don’t have to ask forgiveness.

Which sounds better?

Safety engineers design cars so that you will not be injured in most car accidents!

A better life,

brought to you by

Safety Engineers!

Which sounds better?

Do you have what it takes to be a safety engineer?
The few, the proud, the nerdy!

Safety: We think about it so you don't have to!

International System Safety Society

A catch phrase might help:

International Systems Safety Society

The Safety Engineering people!

A catch phrase might help:

- **Do you have an idea for an ISSS catch phrase that can be associated with the society in a positive manner?**
- **Send submissions to:**

  HSV-ISSS-WebGuru @

Educational Safety Contest

- Example build “Cars” to hold eggs, and survive impact with a “brick wall” [concrete block?].
- ISSS could provide a track for cars roll down, (and contains the mess from losers.) Move from school to school. Put the design on internet.

Egg Car Contest

- Need volunteers to help design the contest rules, portable track, cleanup cart, etc.
- Need volunteers to take the track to schools, give a brief (2-5 minutes) introduction and bring it back to (see next).
- Need volunteer to store track/cart between schools.
- Would need $ 0??? to purchase parts.

Educational Contest

- Better ideas???

Safety:

We think about it

so you don't have to!

International System Safety Society