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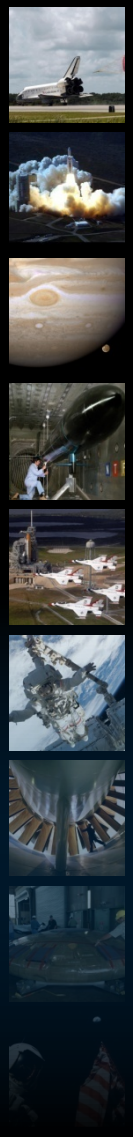

The Cost of Silence:
Normalization of Deviance and Groupthink

Senior Management ViTS Meeting

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This and previous presentations are archived at
sma.nasa.gov/safety-messages

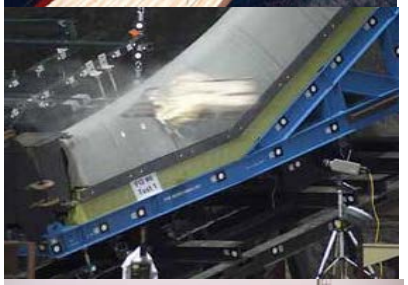
Normalization of Deviance

Vaughan's Normalization of Deviance

> "Social normalization of deviance means that people within the organization become so much accustomed to a deviation that they don't consider it as deviant, despite the fact that they far exceed their own rules for the elementary safety"
>
> —Diane Vaughan, 1996

Examples

- Shuttle Solid Rocket Booster O-ring received criticality 1 waivers despite design goal of no joint failures. *Joint material erosion and blow-by were accepted as risks.*
- Shuttle External Tank foam loss was viewed as maintenance issue, not a safety-of-flight issue despite observed damage and design goal of no foam loss. *Foam strikes to orbiters were accepted as risks.*
- Cruise ship *Costa Concordia* grounded on Isola del Giglio, Italy. *The ship captain consciously deviated from the approved course.*
- International Space Station Extra-vehicular Activity-23 (ISS EVA-23) water in helmet close call occurred a week after a drink bag leaked in the same suit. *Previous drink bag leaks allowed a conclusion of the same problem.*



Groupthink

Normalization of Deviance Can Lead to Groupthink

There's a natural human tendency to rationalize shortcuts under pressure, especially when nothing bad happens. The lack of bad outcomes can reinforce the "rightness" of trusting past success instead of objectively assessing risk.

Richard Feynman compared the practice to Russian Roulette:

"When playing Russian roulette the fact that the first shot got off safely is little comfort for the next. For a successful technology, reality must take precedence over public relations, for nature cannot be fooled."

In real life, it's more uncertain than that. We're not playing Russian roulette. When dealing with exotic new materials, thin technical margins or high-energy systems, we don't even know how many bullets are in the gun.

There are eight symptoms of groupthink. All of them need not be present for the process to influence decisions.

Eight Symptoms of Groupthink

Groupthink

"…a quick and easy way to refer to a mode of thinking that persons engage in when they are deeply involved in a cohesive in-group, when concurrence-seeking becomes so dominant that it tends to override critical thinking or realistic appraisal of alternative courses of action."

—Irving l. Janis, 1982

1. Illusion of Invulnerability

When engineers raised the possibility of O-ring blow-by, it was said that this risk "was true of every other flight we have had."

2. Belief in Inherent Morality of the Group

"I had the distinct feeling that we were in the position of having to prove that it was unsafe instead of the other way around."

3. Collective Rationalization

"We were counting on the secondary O-ring to be the sealing O-ring under the worst case conditions."

Eight Symptoms of Groupthink continued

4. Out-Group Stereotypes

"My God, Thiokol, when do you want me to launch—next April?"

5. Self-Censorship

A no-go recommendation below 53 ^{O}F at the pad became "Lower temperatures are in the direction of badness for O-rings."

6. Illusion of Unanimity

Silence is interpreted as agreement.

7. Direct Pressure on Dissenters

"Take off your engineering hat and put on your management hat."

8. Self-Appointed Mindguards

Subject matter experts excluded from decision briefs and meetings.

Recommendations

1. **Never use past success to redefine acceptable performance. Consider risk decision options after in-depth analysis and objective assessment of scenario-driven probability and severity.**

2. **Require systems to be proven safe and effective to operate to a formally acceptable risk level, rather than the opposite.**

3. **Prevent groupthink; know and avoid its symptoms. Appoint people to represent opposing views or ask everyone to voice their opinion before discussion.**

4. **Keep safety programs independent from those activities they evaluate.**

5. **Balance project schedule, milestones and operational tempo against available resources based on an impartial, comprehensive risk assessment.**

6. **Employ a rigorous systems engineering process. Seek a safe and balanced design in the face of opposing interests and conflicting restraints. Focus on assessments to optimize the overall design and not favor one system/subsystem at the expense of another.**

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