

Aviation Human Factors Industry News

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From the sands of Kitty Hawk, the tradition lives on.

Hello all,

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FAA Proposes Safety Management Systems For Airlines

NPRM Published In The Federal Register

The FAA has proposed to require **Safety Management Systems (SMS)** for most commercial airlines. Safety management systems give operators a set of business processes and management tools to examine data from everyday operations, isolate trends that may be **precursors** to incidents or accidents, and develop and carry out appropriate risk mitigation strategies. They are a formal approach to managing an organization's safety through four key components - **safety policy, safety risk management, safety assurance, and safety promotion.**

"Safety is our top priority," said U.S. Transportation Secretary Ray LaHood. "This program can help airlines identify possible safety problems and correct them before they lead to accidents."

"We need a holistic approach to safety that allows us to spot trends in aviation and make necessary changes to help avoid incidents and accidents," said FAA Administrator Randy Babbitt. "Safety Management Systems are a critical piece of a successful **safety culture.**"

The requirements of the SMS proposal would define "what" is expected rather than "how" the requirement is to be met. This allows for development and implementation of an SMS that matches the size, complexity and business models of diverse organizations in ways appropriate to their unique systems and operating environments.

Under the proposed rule, scheduled air carriers and a few others operating under Part 121 of federal aviation regulations would be required to implement an **SMS within three years.** The carriers would have to submit their SMS implementation plans to the FAA within six months of the final rule's effective date.



The plan would be required to show how the airline intends to comply with the rule within the three-year implementation period. An SMS would not take the place of regular FAA oversight, inspection and audits to ensure compliance with existing regulations

The FAA began exploring system safety-based oversight concepts in the mid- to late- 1990s. During that time, the agency concluded system safety has to be practiced by operators, repair stations, flight schools, other aviation service providers and the agency itself. In 2006, the International Civil Aviation Organization (ICAO) required that all member countries implement SMS standards for operators and approved maintenance organizations.

The FAA's own Air Traffic Organization has already begun implementing an SMS, and the agency recently issued a notice of proposed rulemaking that would require FAA-certified airports to establish SMS for all airfield and ramp areas.

The estimated cost of this proposed rule for U.S. air carriers is \$390 million, with estimated benefits of \$470 million. The proposal conforms to ICAO SMS provisions.

FMI: www.ofr.gov/OFRUpload/OFRData/2010-28050_PI.pdf

FAA asked for comments by Feb. 3, 2011; submit them via www.regulations.gov, using Docket Number FAA- 2009-0671.

Capt. Chesley Sullenberger, aviation hero, shares his experience with ARL human factors and ergonomics expert

Capt. Chesley Sullenberger stands with the attendees of the 54th Annual Meeting of the Human Factors and Ergonomics Society.

Military experts in human research and engineering, including Petra Alfred, from the U.S. Army Research Laboratory, recently participated in a military-only discussion with Capt. Chesley "Sully" Sullenberger about one of the most [sensational case studies of human factors and ergonomics](#) in modern times.

On Jan. 15, 2009, after geese flew into the engine of US Airways Flight 1549 and the aircraft rapidly began losing altitude, Sullenberger decided to land the plane on the Hudson River. Sullenberger's actions were credited with saving 155 lives that day. According to Alfred, an industrial and organizational psychologist based at ARL's Fort Sam Houston, Texas field element, "his address, as well as the discussion afterwards, was not only fascinating, but nicely illustrated through firsthand accounts [why human factors and ergonomics](#) are so important in human performance, system design, and safety."



Sullenberger was the keynote speaker at the 54th Annual Meeting of the Human Factors and Ergonomics Society, an event that promotes the discovery and exchange of knowledge concerning the characteristics of human beings that are applicable to the design of systems and devices of all kinds.

"During (Sullenberger's) address, he played the actual 'black box' recording and then verbally walked us through what happened in those few seconds in his mind," Alfred recalled. "He also pointed out inconsistencies such as the air traffic controllers suggesting he go to other airports when he clearly could not make it back to the original airport, much less something further away.

"As he dropped in altitude, and he decided to land in the Hudson, it was as if they could not grasp or believe what he was saying," Alfred added.

Particularly noteworthy, Alfred said, were Sullenberger's recollections of rote behavior that aligned with following required checklists by memory. This, she said, describes part of the [human factors research](#) as applied to the aircraft industry.

Pilot Reliance on Automation Erodes Skills

Increasing reliance on cockpit automation appears to be significantly eroding the manual flying skills of many airline pilots, who are then "sometimes

not prepared to deal with non-routine situations," according to the researcher behind a sweeping air-safety study released Thursday. Presented to an international aviation safety conference here by senior Federal Aviation Administration scientist Kathy Abbott, the study's conclusions buttress the idea that a significant percentage of airline pilots **rely excessively** on computerized cockpit aids. Such adherence to computer-assisted piloting—and the confusion that can result when pilots fail to properly keep up with computer changes—increasingly are considered **major factors** in airliner crashes world-wide.

Prepared by a team of industry, labor, university and government experts, the findings reveal **fundamental safety gaps** in commercial aviation. And they are likely to prompt stepped-up debate over whether pilot training should be changed to reverse that trend.

Kathy Abbott, the agency's chief technical advisor for flight deck design and **human factors**, said the participants analyzed more than 730 incidents, 26 accidents and some 9,100 flights world-wide between 2001 and 2009. The study found, among other things, that **manual flying errors** contributed to about 60% of selected accidents and 30% of selected incidents perused by the team. Those statistics "got our interest, as you can imagine," Ms. Abbott said. The errors included inappropriate control inputs by pilots and incorrect responses when trying to recover from aircraft upsets.

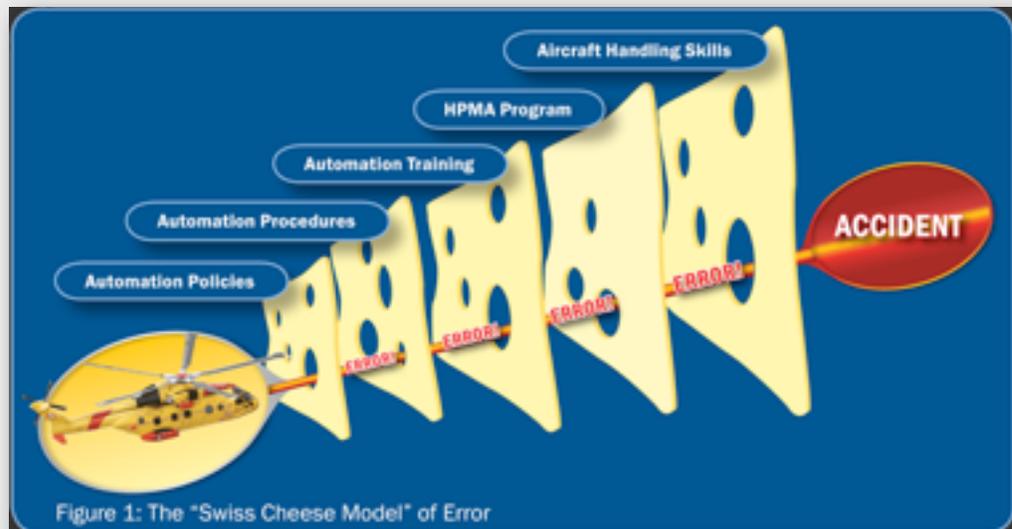


Figure 1: The "Swiss Cheese Model" of Error

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Thursday's report summary was long awaited by regulators and airline officials, because it is a way to understand and highlight the hazards of excessive pilot dependence on automation. The group of experts, including aircraft manufacturing executives and pilot-union representatives, isn't expected to release the final document until next year.

But already, the preliminary conclusions are pinpointing problems some pilots have in **properly recognizing when** autopilots should be engaged or disconnected in certain types of emergencies. Focusing too much on manipulating flight-control computers, according to Ms. Abbott, often "distracts from managing the flight path of the airplane."

The study is intended to update an influential 1996 FAA-sponsored examination of the benefits and drawbacks of cockpit automation. But because automated flight-management systems, navigation aids and autopilots have progressed so dramatically since the 1990's, the latest study is widely expected to **set a benchmark**. Other groups and organizations are looking to conduct follow-up research based on its findings.

One cross-cutting theme spelled out in the report, according to Ms. Abbott, is that "pilots **sometimes abdicate too much responsibility** to the automated systems." Part of the reason, she said, are persistent messages pilots receive from airline management and trainers stressing that "automated systems can do the job better than they can." The study also found that in some cases, pilots don't get adequate opportunities to practice hand-flying skills and therefore often **don't feel comfortable** grabbing control away from sophisticated flight-deck computers in an emergency.

- **FAASafety.gov**

Maintenance Safety Tip
Notice Number: NOTC2663

FAASTeam Maintenance Safety Tip - By Eastern Region FAASTeam
November 2010

- **HOW AWARE ARE YOU?** In the first phase of the FAA Human Factors in Aviation Maintenance study, the FAA determined that one of the major obstacles to technicians achieving productivity goals was their **inability to see the big picture**. Often technicians are given only their piece of the puzzle, for example, being assigned tasks with deadlines without explanation or direction -- a **“just do it”** assignment. Another common situation is performing a portion of a major task, possibly without training or explanation as to how their actions affect the overall task. Accidents and incidents occur when we are **unaware of others and when focus is lost**. If we train ourselves to be more aware of others while focused on the task at hand, we have taken a major step toward accident and incident prevention in the work place. To help you stay focused, continually ask these three questions: **First**, How do we achieve situational awareness, **Second**, How do we know we have situational awareness, and **Third**, How do we know we’ve lost situational awareness?
Stay alert and stay safe!

Drowsy Driving Prevention Week® Highlights
Prevalent and Preventable Accidents

It's Drowsy Driving Prevention Week®, a National Sleep Foundation public awareness campaign to educate drivers about **sleep safety**. The AAA Foundation for Traffic Safety released a new study showing that the tragedy of drowsy driving is **more pervasive** than shown in previous estimates.

Their study shows that drowsy driving involves about one in six deadly crashes; one in eight crashes resulting in occupant hospitalization, and one in fourteen crashes in which a

Driving Drowsy is DEADLY

vehicle was towed. These percentages are substantially higher than most previous estimates, suggesting that the contribution of **drowsy driving** to motor vehicle crashes, injuries, and deaths has not been fully appreciated. The National Highway Traffic Safety Administration estimates that drowsy driving results in **1,550 deaths**, **71,000 injuries** and more than **100,000 accidents each year**. The AAA Foundation for Traffic Safety analysis of the accidents resulting from drivers falling asleep behind the wheels is cause for alarm and concern. According to the study, younger drivers age 16-24 were nearly **twice as likely** to be involved in a drowsy driving crash as drivers age 40-59, and about 57 percent of drowsy driving crashes involved the driver drifting into other lanes or even off the road.

The study also found that –

- Vehicles in which the driver was accompanied **by a passenger** were nearly 50 percent less likely to be involved in a drowsy driving related crash.
- More than half (55%) of those drivers who reported having fallen asleep while driving in the past year said that it occurred on a high-speed divided highway.
- More than half (59%) of those drivers who reported having fallen asleep while driving in the past year said they had been driving for **less than an hour** before falling asleep; only one in five reported they had been driving for three hours or longer.
- More than one in four drivers (26%) who reported having fallen asleep while driving in the past year reported that it had occurred between noon and 5 p.m.
- **Men (52%) were much more likely** than women (30%) to report having ever fallen asleep while driving; men (14%) were also more likely than women (8%) to admit having done so in the past year.
- Drivers age 24 and younger were most likely to report having fallen asleep in the past year, but they were least likely to report having ever fallen asleep.

- This is consistent with other studies that have found younger drivers to have a higher risk of falling asleep at the wheel.

According to the Foundation's 2009 Sleep in America poll, about one-third (28%) of Americans admitted that they have fallen asleep behind the wheel within the past year, and more than half (54%) said they have driven while drowsy. The following **warning signs** indicate that it's time to stop driving and find a safe place to pull over and address your condition:

- Difficulty focusing, frequent blinking and/or heavy eyelids
- Difficulty keeping reveries or daydreams at bay
- Trouble keeping your head up
- Drifting from your lane, swerving, tailgating and/or hitting rumble strips
- Inability to clearly remember the last few miles driven
- Missing exits or traffic signs
- Yawning repeatedly
- Feeling restless, irritable, or aggressive.

Sleepiness can impair drivers by causing slower reaction times, vision impairment, lapses in judgment and delays in processing information. In fact, studies show that being awake for more than **20 hours results in an impairment equal to a blood alcohol concentration of 0.08%**, the legal limit in all states. It is also possible to fall into a 3-4 second microsleep without realizing it.

Here's what you can do to prevent a fall-asleep crash:

- Get a good night's sleep before you hit the road. You'll want to be alert for the drive, so be sure to get adequate sleep (seven to nine hours) the night before you go.
- Don't be too rushed to arrive at your destination. Many drivers try to maximize the holiday weekend by driving at night or without stopping for breaks.
- It's better to allow the time to drive alert and arrive alive.
- Use the buddy system. Just as you should not swim alone, avoid driving alone for long distances. A buddy who remains awake for the journey can take a turn behind the wheel and help identify the warning signs of fatigue.
- Take a break every 100 miles or 2 hours. Do something to refresh yourself like getting a snack, switching drivers, or going for a run.

- Take a nap—find a safe place to take a 15 to 20-minute nap, if you think you might fall asleep. Be cautious about excessive drowsiness after waking up.
- Avoid alcohol and medications that cause drowsiness as a side-effect.
- Avoid driving at times when you would normally be asleep.
- Consume caffeine. The equivalent of two cups of coffee can increase alertness for several hours.

Circadian Profile and Shiftwork

Have you ever wondered why some people have an **easier time** staying alert through the overnight hours than others? Every human has bodily functions that fluctuate over the course of 24-hours. These functions occur on what are called a **circadian rhythm** and include things such as the sleep/wake, body temperature, digestive secretions, and hormone production. Yet while everyone's body functions fluctuate throughout the day, there's tremendous variation among individuals in precisely when their rhythms peak and trough. These peaks and valleys are important because they determine which hours people are likely to be comfortable going to sleep, waking up, or working.



Based on people's tendencies in these areas, three general circadian profiles exist. They are:

- 1) **Regular types**. The most common of the three circadian profiles, 'regular robins' are those people who prefer to wake up between 6:30 and 8:30 a.m. and go to bed between 10:30 and midnight. Their high period of alertness is in the late morning and early evening.
- 2) **Morning types**. Also referred to as 'larks,' these people tend to get out of

bed as early as 4 or 5 a.m. and go to bed by 9 or 10 p.m. Their high period of alertness is about two hours earlier than people with the standard profile.

- 3) **Evening types**. Evening types 'owls,' love to sleep into the late morning but have no trouble staying awake and alert past midnight. Their high period of alertness is about two hours later than people with the standard profile.

Research has shown that **evening types** tend to have an easier time staying alert on the **night shift** and sleeping in the morning than their robin and lark counterparts. This is because owl's times of peak performance start out more closely aligned with the times they need to be alert when working nights. In other words, if you are comfortable sleeping until noon and staying awake until 3 a.m. then working until 7 a.m. isn't too much of a stretch.

Morning types, meanwhile do well on day shifts but may have a particularly difficult time with night shifts. To get the sleep they need to stay alert at night, they may have to put more effort into creating a quiet and dark sleep environment so that they can **take advantage of pre-work napping opportunities during the day**.

How To Run Faster and Longer

Who needs steroids or human growth hormone? Athletes can enhance their **performance** with something that is both legal and easily obtained. It's called music, says BBC.com. In a study of Australian triathletes, found that **listening to music tracks** by the likes of Queen, Madonna, and the Red Hot Peppers increased the athletes' energy efficiency by 1 percent to 3 percent, enabling them to do more with the same amount of oxygen. "Music is like a legal drug for athletes," says British researcher Costas Karageorghis.



“It can reduce the perception of effort significantly and increase endurance by as much as 15 percent.”

The key is finding music **whose tempo is synchronous** with a runner’s desired stride; Haile Gebrselassie, who recently set a new world-record marathon time, likes running to the techno pop song “Scatman,” with a tempo of about 135 beats per minute. Even recreational runners, researchers say, can benefit from musical accompaniment.

Picture This

Bad Human Factors Design

