THE NEED FOR ONE MORE LOOK
or
WHEN WHITE HAIR IS A GOOD THING

Presented by
Keith J. Volkert, CEO
Satellite Consulting, Inc.

AEROSPACE:
The "Good" and The "Bad" of It

The aerospace industry has produced and continues to provide amazing technical solutions for an ever increasing number of challenges. The industry has developed processes for reviews and cross checks. But far too often we read about the "errors" that go undetected until they lead to a major failure.

WHITE HAIRS TO THE "RESCUE"

Satellite Consulting, Inc. is a strong proponent of using senior technical talent that is readily available in the pool of retired engineers to provide that one last look through a more experienced set of eyes.

STATEMENT OF PROBLEM

- In the aerospace industry, too many errors or oversights and are discovered very late or worse yet go undetected and lead to failures in orbit. The current process driven environment does not do a good job in identifying the design oversights.

Proof of
STATEMENT OF PROBLEM

- We read about the major spectacular oversights, but a myriad of less dramatic but no less damaging “oversights” are launched every year. One has only to look to the insurance claims for in-orbit losses in the last decade to provide the “proof” that a problem exists.

CAUSES OF PROBLEM

- No single cause but often combination of factors
- Relying on process
- Schedule pressures
- Fewer senior experts on staff
- Less time for reviews
- Limited number of independent reviewers

CAUSES OF PROBLEM
(continued)

- Much smaller customer teams
- ITAR has reduced content
- Financial pressures

► *Relying on Process*

- Process driven approach assumes "Process" will identify problem
- Process is no better than the experience base of the person or persons who defined the process and commit them to words.
- Process focuses on the last problem found, not the next one.

► *Schedule Pressures*

- Aggressive schedules contribute to risk of missing a critical point
- Often commit to flight hardware build prior to completion of qualification testing
- Constant need to shorten schedules

► *Fewer Senior Experts*

- Experience level may not be what it once was
- Number of senior people continues to be reduced, and authority given to teams of engineers without direct individual responsibility.

► *Inadequate Reviews*

- Allowable time period for reviews has been shortened.
- Where a full PDR was five days in an earlier time, now the review is one and a half to two days. Currently, the total allocated time for the series of unit reviews, subsystem reviews and spacecraft reviews has been greatly reduced.

► *Limited Number of Independent Reviewers*

- Only a limited number of design reviews have truly independent reviewers. If audience is primarily the design team, they do not necessarily probe their design.

► *Smaller Customer Teams*

- Many customers have reduced their in-house and on-site customer oversight teams. These reviewers used to initiate the detailed discussions that often led to the discovery and early identification of problems. The early INTELSAT PDR and CDR teams were often 15 to 25 people.

► *ITAR Factor*

- ITAR has led to greatly reduced content of design review packages if the customer is a foreign entity. Use of prior design review package leads to “lowest common denominator” review packages.

► *Financial Pressures*

- Financial aspects
- Cost cutting to reduce senior salaries and allow younger engineers to move into decision making positions

BENEFITS OF
WHITE HAIR REVIEWS

- Critical Starting Point:
  - Need to select the proper senior technical person who has the unique background and skill-set to really contribute.

BENEFITS OF
WHITE HAIR REVIEWS
(continued)

- Clear Focus:
  - Independent senior reviewers have a clear focus on their assignment and are not distracted by other obligations

BENEFITS OF
WHITE HAIR REVIEWS
(continued)

- Willing to Challenge:
  - Senior reviewers have earned the right to challenge on a technical question and will not easily accept the “computer gave us that result” level of answer.

BENEFITS OF
WHITE HAIR REVIEWS
(continued)

- Lack of Political Agenda:
  - Senior reviewers do not have a political agenda and are not concerned with the next performance review cycle.

BENEFITS OF
WHITE HAIR REVIEWS
(continued)

- Learned from Mistakes:
  - Although it sounds like a cliché, we do make the same mistakes over and over again. Senior consultants have seen and suffered from those mistakes and still remember.

BENEFITS OF
WHITE HAIR REVIEWS
(continued)

- Been There – Done That:
  - Independent reviewers may bring a different set of company knowledge, i.e., “we tried that and it never works”. Sometimes existing corporate knowledge may be outdated or not correct.

BENEFITS OF WHITE HAIR REVIEWS (continued)

- Need for Discussion:
  - Senior reviewers have a propensity to start meaningful technical discussions that lead to a real review of the design. Far too often, reviewers flip the pages and read the material as written with no real discussion of the design.

RESOURCE POOL

- You can identify points of time in the 1950s as the start of the aerospace buildup, but the real growth started in the 1960s with President Kennedy and the mission to the moon. That peak ended in 1969, 1970 and 1971 with a steep decline in work and decrease in new engineers entering the field.

RESOURCE POOL
(continued)

- Young engineers entering the field of aerospace in 1965 just out of college are in their early 60s today. My first assignment was on the Apollo Program in 1967. This large pool of talent has reached the age of retirement. They have 40 plus years of experience and many still have the burning excitement and drive that lead to the incredible accomplishments at which we all marvel.

RESOURCE POOL
(continued)

- Other waves on the best and brightest followed to develop satellites, the shuttle and the interplanetary spacecraft. I was lucky enough to work at JPL for most of the 1970 decade. I was part of the teams that design, built and tested the Viking Orbiters, the Voyagers, and the Galileo. That was a remarkable time and provided a chance to work with a select group of very talented engineers and managers. Many are now retired and have 30 plus years of experience.

RESOURCE POOL
(continued)

- Somewhere in the 1980s and 1990s the best and brightest no longer saw aerospace as the most exciting and most rewarding field to pursue. Computers, software development, wireless and other innovative items led the young engineers to the new pursuits who two decades before would have been aerospace engineers. Aerospace still attracts some very talented young people, but in limited numbers.

RESOURCE POOL
(continued)

- Starting in the late 1990s one had only to look at the age of key engineering staffs in many groups within the aerospace community and what you often found was a very senior bias or a bimodal distribution with seniors and juniors and a fewer engineers at the midpoint in their careers.

RESOURCE POOL
(continued)

- This varied by company and by the financial ups and downs that these companies went through, but the story was very similar in many. Within the last five to ten years companies developed programs to reduce the number of seniors and move younger engineers into positions of responsibility.

Process Driven Design and Decisions by Committee

- Some of the aerospace companies are relying more and more on process and less and less on individual contributions. Some believe that process will provide the product, and special unique persons are not as important as they were before the processes were added.

Decisions by Committee

- Another new aspect of the aerospace world is the advent of the group decision approach to engineering. There are some positive aspects to accepting inputs from everyone in the room, but there are some questions in my mind if this process really provides a solution every time that leads to best design. It is often hard to find the "person" who says "this is my design". One result of a design by committee is that no one on the committee can stand up and challenge the design.

Summary and Conclusions

- Our industry can and should do a better job of reviewing designs
- Independent senior review should be a part of that
- The pool of retired senior specialists should be utilized