THE VALUE OF PERFORMANCE.

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System Safety

A Glimpse into the Future

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Agenda

1. A Glance Back in Time
2. Where We Are Today and Tomorrow
3. Summary and Questions

A Glance Backwards

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In the Beginning

- Began as a grass roots movement that was introduced in the 40s, gained momentum during the 50s, became established in the 60s, and formalized its place in the acquisition process in the 70s.
- System Safety Engineering arose as a formal discipline during the late 1950s/ early 1960s
  - Primary purpose was to manage risk and avert failures of the American space and rocket program
    - e.g. Minuteman Missile Program in 1962

A Glance Backwards

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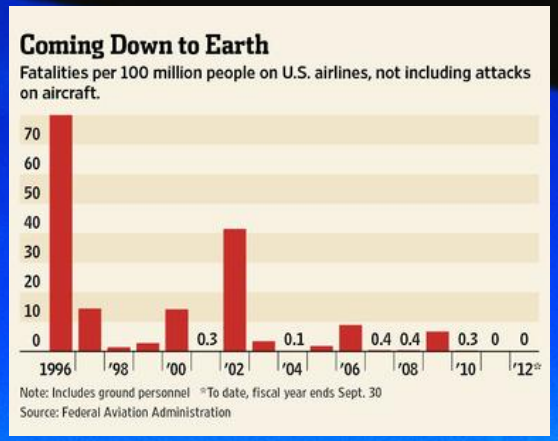
- System Safety Tends to Look Into the Rear View Mirror
  - Past Accidents
  - Lessons Learned
  - Prior service history
  - Etc.

We Have Learned to Apply Our Lessons Well



"Flying on U.S. airlines has become so safe that experts increasingly believe the biggest remaining risk of an accident is when the wheels are on the ground."

Airline industry and government officials said this month that to improve safety on scheduled flights by U.S. passenger and cargo carriers, they are focusing more on countering hazards present before takeoff and after touchdown.

ANDY PASZTOR, 2011 http://www.aircraftsystemsafety.com/default.asp?iID=GEMMDF&iPostID=KDDHE

Where We Are Today

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- Many Industries perform System Safety Engineering
  - Insurance
  - Defense
  - Aerospace
  - Pharmaceutical
  - Petrochemical
  - Nuclear
  - Automotive
  - Mass transportation
  - Others…

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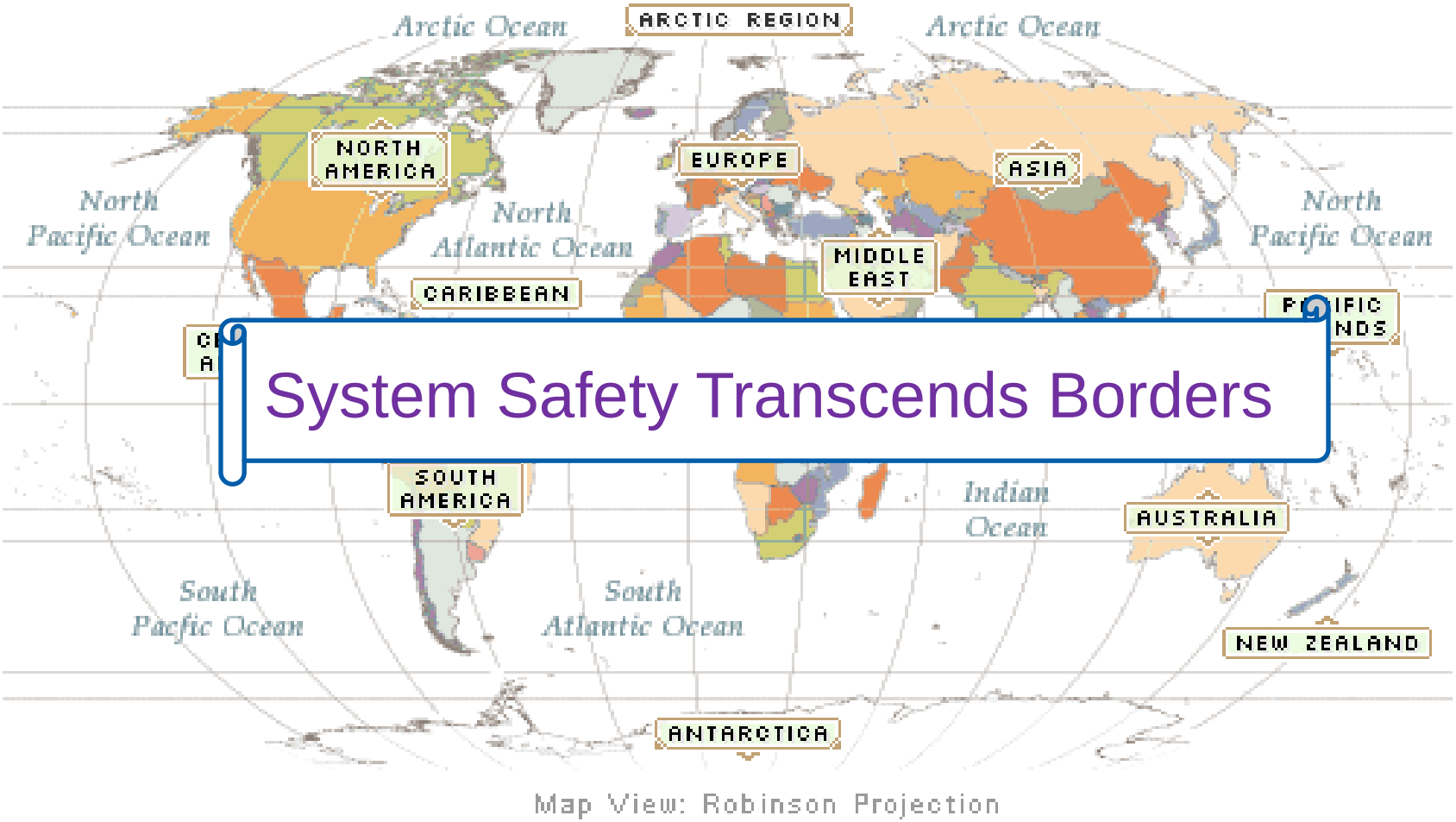
Globalization



The Global Marketplace

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For Example:

LCS 2

- Nulka Decoys– Australia (BAE Systems)
- SeaRAM - USA (Raytheon)
- Bofors MK 57mm - Sweden (Bofors Defense)
- Sea Giraffe 3D Radar - Sweden (SAAB)
- SeaStar Safire – USA (FLIR)
- Integrated Combat Management System (ICMS) – Nederland (Thales)
- Et Cetera

Mitigating Globalization Concerns

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- International Standards
  - Need to be jointly developed (similar to the commercial airborne community)
    - They will/must be:
      - Complete
      - Unambiguous
      - Understandable in all major languages
      - Applied without prejudice in all cases
  - Standards will/must be adhered to in their entirety by all global developers
    - Meeting the intent is NOT good enough!

Boeing 747

Learjet 70 & 75

Mitigating Globalization Concerns

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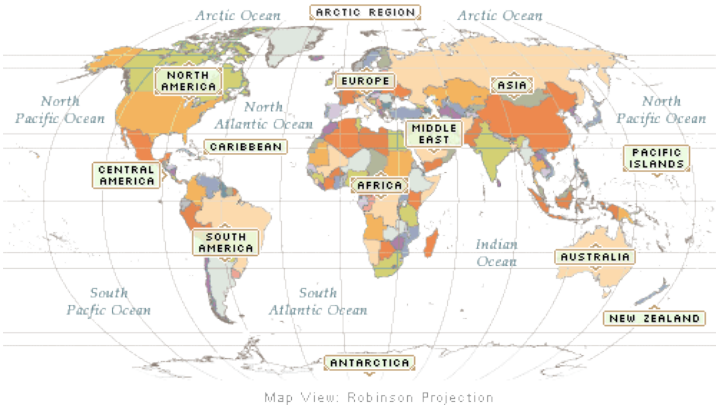
- We must build closer ties between all System Safety Societies including IET, INCOSE, ISSS, etc.
  - There may never be a true International system safety organization due to cultural differences, travel requirements, differing time zones, security concerns, et cetera
    - A confederation of Societies may be the answer
    - For example; the IET and the ISSS have a MOA in place that:
      - Recognizes both organizations as independent entities but allows for mutual advertising, sharing of speakers, et cetera
      - Results in a win-win for both societies as it opens lines of communications without threat

Mitigating Globalization Concerns

- International certification of System Safety Engineers
  - Standards change from country to country largely based on law and influenced by culture, however:
    - The underlying techniques and methodologies are borderless
    - System safety identifies, controls, and manages hazards – the artifacts may look different, but the underlying engineering is identical
  - Therefore: an international certification is doable that validates the persons that performed the analyses are indeed true System Safety Engineering professionals
    - Potential gain is possibly minimizing rework for no technological gain
    - Build a common understanding and trust
  - The certifying authority will be INCOSE and it will be performed as an extension



INCOSE SEP Architecture

For wherever you are in your career

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Multi-Level Base Credentials

The base ASEP, CSEP, and ESEP credentials cover the breadth of systems engineering at increasing levels of leadership, accomplishments, and experience.

Entry Level

Foundation Level

Senior Level

Extensions

Extensions focus on knowledge of a specific domain or subset of systems engineering and can only be earned after a base credential.

INCOSE Acq™

System Safety

Software Safety

We no longer have an SSE Certification

Worldwide Recession

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- Cost and Schedule are becoming the major drivers for new and fielded systems:
  - Risk avoidance is growing
    - Systems capabilities are being downgraded
    - Generally industry is saying no to requirements creep without a modified contract
    - Industry is not as willing to push the envelop on technology unless the risk is shared by the customer
    - Emphasis on affordability (life cycle costs override development costs)
    - Government driving Capability Driven Process
      - Low cost, less documentation (limited or no C/SRDLs), quicker turn around
      - Difficult to document safety efforts without needed artifacts
      - System Safety is often the 1st to get cut with S/CRDLS often getting pushed back in the schedule (i.e, a few weeks before launch???
      - System Safety is often performed as an after thought (report) usually a week or 2 before formal reviews

Statements of Work

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- Often appear to be prepared by non-safety professionals
  - System Safety requirement is sometimes as vague as to just require the system to be safe
    - Result – no safety program is bid or developed until:
      - Becomes big customer surprise during formal program reviews (i.e., PDR/CDR)
      - Becomes a deficiency
  - Often CDRL delivery dates make no sense? It does not benefit a program to perform a SAR at PDR and never require another delivery??
  - Industry is bound by law to comply with OSHA.
    - What does it mean when a single OSHA requirement is called out like 29 CFR 1910.97
      - Does it mean we are only responsible for complying with 29 CFR 1910.97
      - 29 CFR 1910.97 requires additional scrutiny???
  - Often call out outdated or unrelated documentation, for example:
    - MIL-STD-1472 for a satellite?
    - MIL-HDBK-454 for a satellite?
    - MIL-STD-882 often not called out?
  - Non-Value added tasks – i.e. requesting a monthly submittal of accident/injury reports
  - Scope is often poorly defined
  - If System Safety is not called out, it is not part of the negotiating process

Communication

- There is usually no communications network to allow for Government safety and industry safety to communicate often and freely
  - Most communications are controlled through the PMs
  - Scope, S/CDRL requirements and delivery dates are often decided by PMs
  - Take sometimes months to answer a simple safety question
  - Often the question/answer has been mis-communicated and the whole process has to start again leading to costly delays!
  - System Safety Working Groups have mostly been eliminated to reduce costs:
    - How costly are the above issues?
    - Technology can be used to reduce travel costs

- These problems are expanded exponentially for International programs, then:
  - Time zones
  - Language barriers
  - International laws
  - Reporting requirements
  - Et cetera

Our Workforce

- We have an aging workforce
- Difficult to attract young engineers
  - Perceived as a dead end job
  - Perceived to lack upward mobility
  - Perceived to be the bottom of the barrel in engineering disciplines
- Discipline still lacks credibility in Engineering Schools
  - Making progress, but…

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Summary

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- We are victims of our own success – with law and certification requirements being our saving grace
- Industry System Safety Engineers are handcuffed by the SOW
  - Poor SOW will result in a poor system safety program
  - Poor SOW can lead to significant delays in program reviews, development efforts, redesign issues, et cetera
- Communications must be improved
- Standards must be followed closely to avoid integration issues
- International certification of System Safety Professionals is needed desperately
- Developing Memorandums of Agreements between Societies may resolve some of our communication issues

Thank You!

Questions


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