



Amsterdam 2019

# FLIGHT RISK ASSESSMENT TOOLS

Design & Integration into the Four Pillars of SMS

# PRESENTER BACKGROUND

- **Chief Pilot – U.E.O.** – EBRPD Police & Fire, USA
- **Lead Assessor** -Airborne Public Safety Assoc. (APSA)
- **Offshore Captain** – ERA, PHI, Oil & Gas, Gulf of Mexico
- **Charter & Tour Pilot** – Bajan Helicopters, Caribbean
- **Chief Flight Instructor FAA Part 141** – Heli. Adv. Inc., USA
- **Police Officer/Detective** - Surrey Police, UK
- FAA/CAA ATP(H) , CPL (A), S/E, M/E, CFI/II, 9,800+ PIC
- Police, Fire, HEMS, NVG, Offshore, Charter, TV, Training



# APSA ACCREDITATION

- **Over past 5 years, over 30 agencies in the US and internationally have been assessed or accredited, including:**
- California Highway Patrol – Air Operations Division (Reaccreditation)
- Texas Department of Public Safety – Air Operations Division
- Atlanta Police Air Operations, Georgia (Pending Application)
- Metro-Nashville Police, Tennessee (Pending Application)
- St. Louis Police, Missouri (Reaccreditation)
- Travis County, STAR Flight, Texas
- Seminole County, Air Operations Unit, Florida

# APSA ACCREDITATION

- **Over past 5 years, over 30 agencies in the US and internationally have been assessed or accredited, including:**
- Federal Bureau of Investigation – FBI Tactical Helicopter Unit
- Federal Bureau of Investigation – FBI Field Aviation Operations
- Columbus Police – Helicopter Unit, Ohio (Reaccreditation)
- Spokane Police Air Support Unit, Washington State (Reaccreditation)
- East Bay Regional Parks Police & Fire – Air Support Unit, California
- Pinellas County Sheriff's Office, Air Support Unit - Florida (Pending)
- Delaware State Police – Air Operations

# FLIGHT RISK ASSESSMENT TOOLS

- Purpose:
  - When implementing a **Safety Management System (SMS)**, one of the most critical components to develop is a Flight Risk Assessment Tool (FRAT). Because **every flight has some level of risk**, it is critical that pilots are able to differentiate, in advance, between a low risk flight and a high risk flight, and then **establish a review process and develop risk mitigation strategies**.
  - A FRAT enables **proactive hazard identification**, is easy to use, and can visually depict risk. It is an invaluable tool in helping pilots make better go/no-go decisions and should be a **part of every flight**.

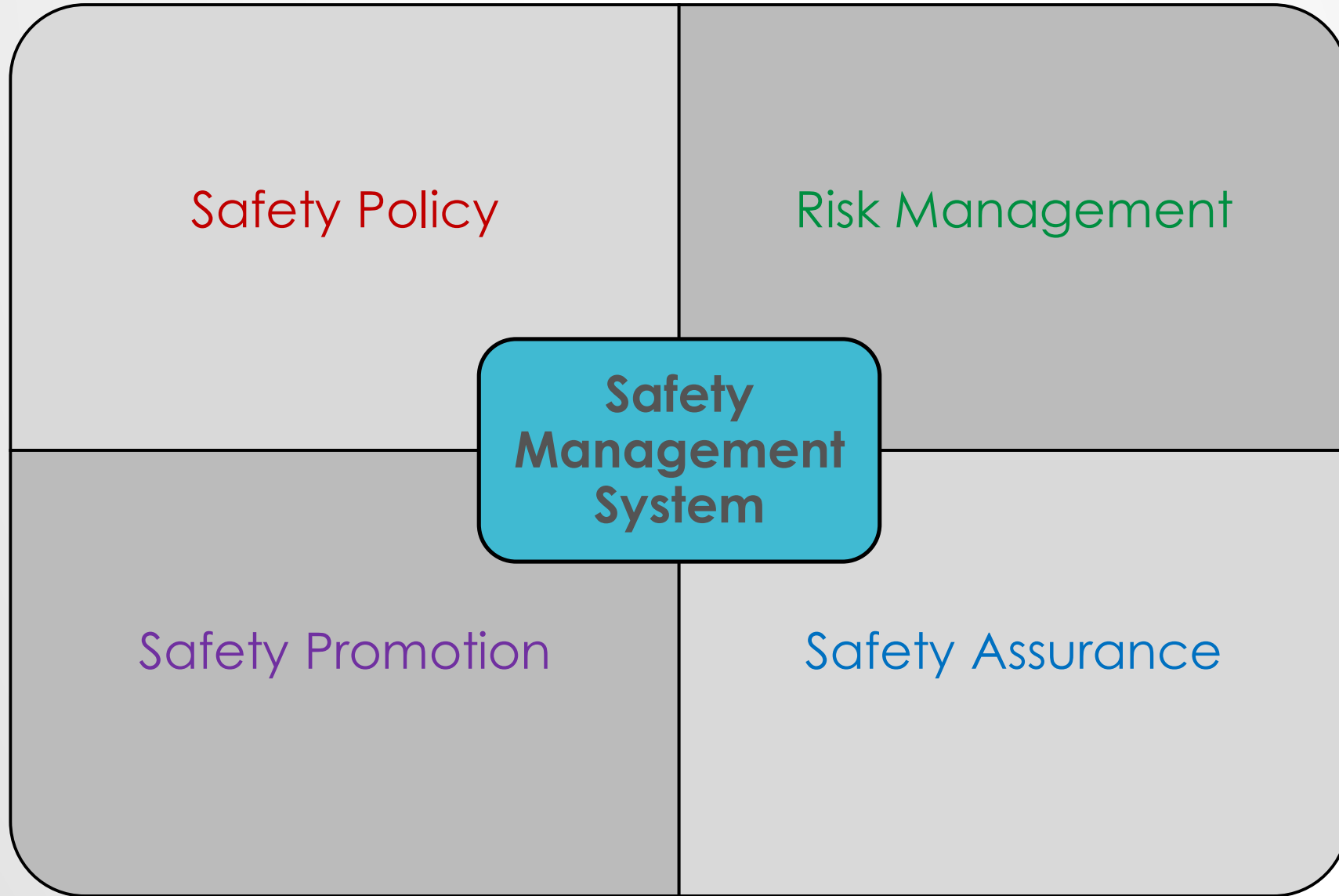
# FLIGHT RISK **AWARENESS** TOOLS

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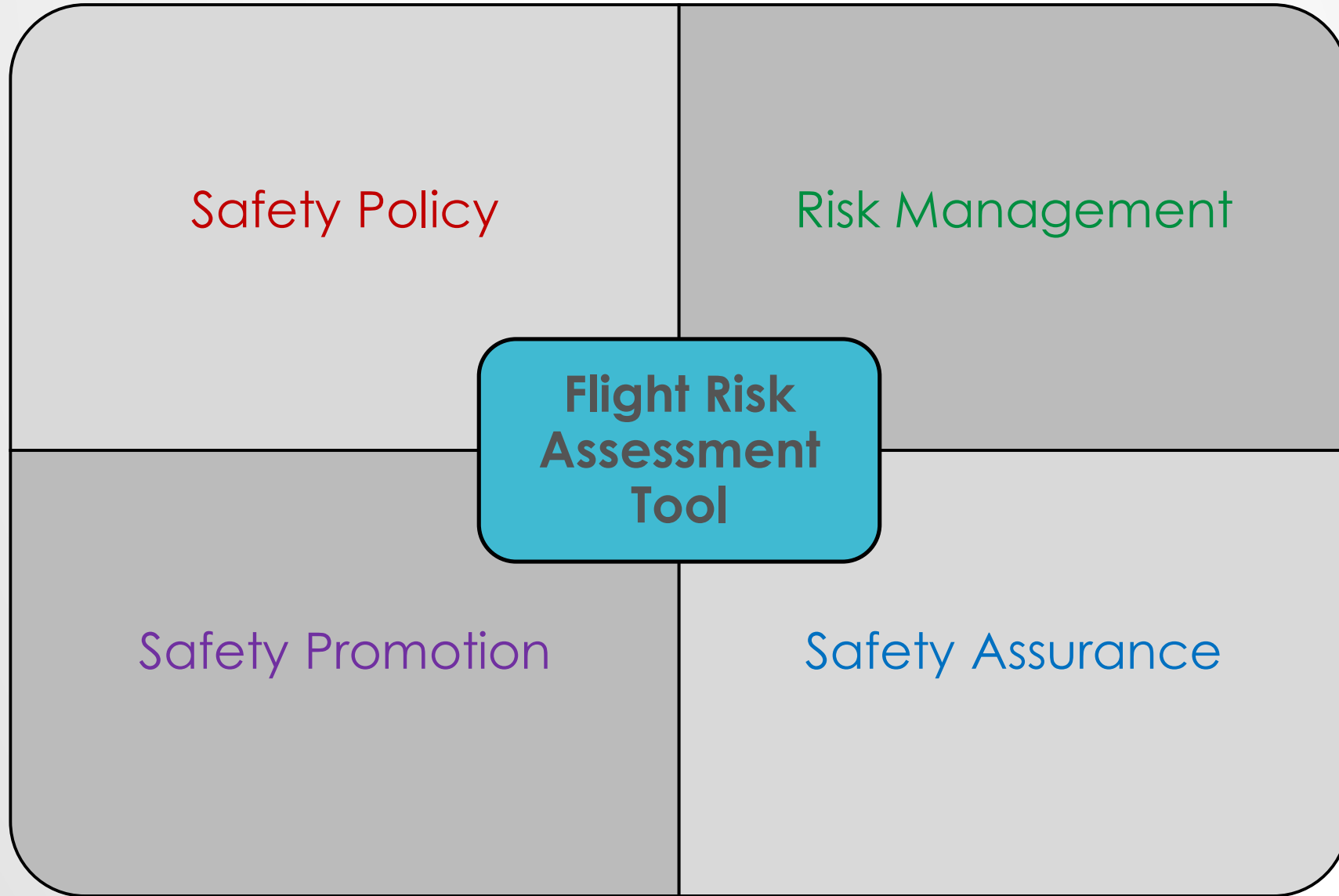
# FLIGHT RISK **AWARENESS** TOOLS

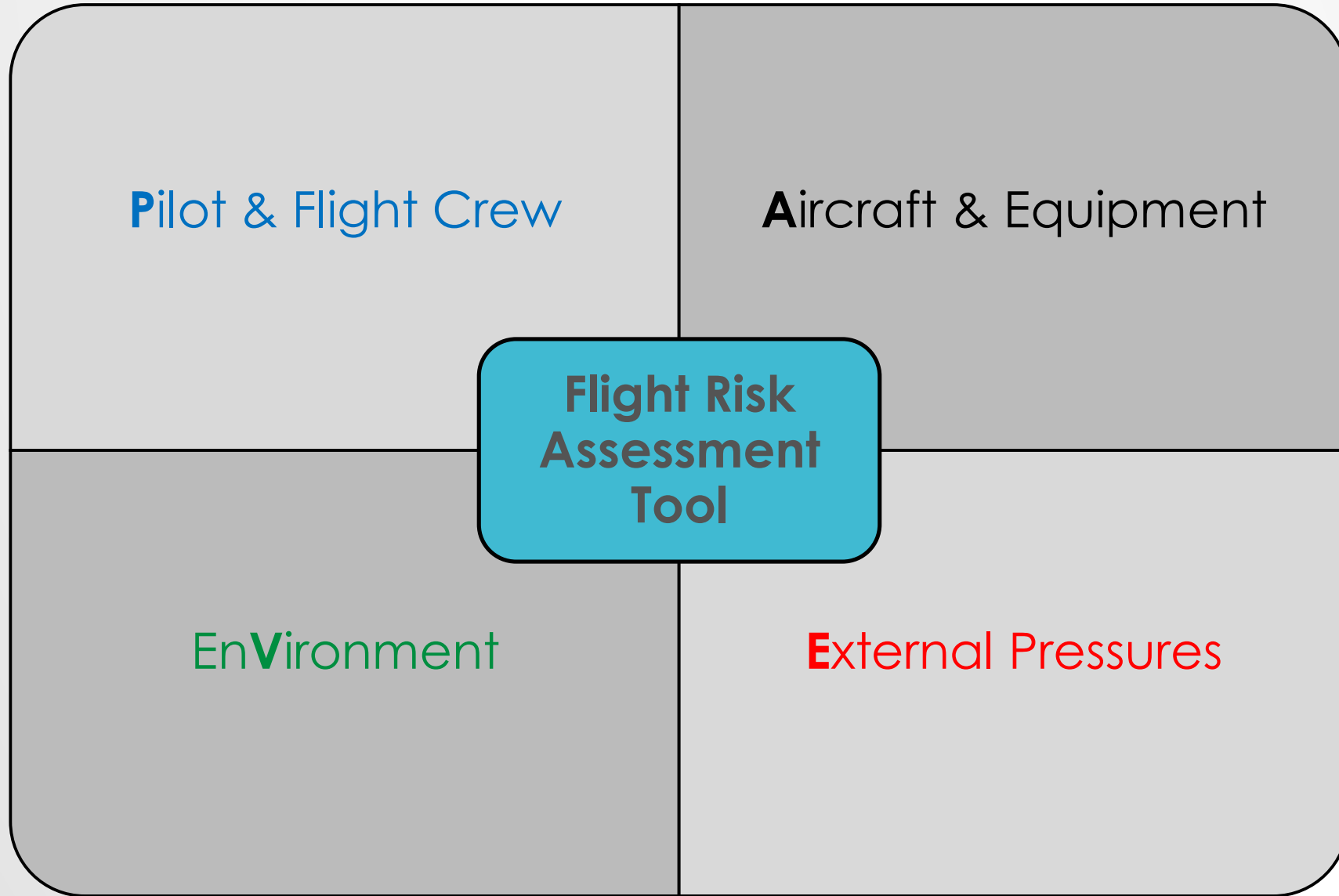
- A Risk Assessment Tool should :
  - allow operators and pilots to see the risk profile of a flight in its planning stages.
  - Be woven into the fabric of the 4 SMS pillars
- Each Operator should:
  - determine an acceptable level of risk for its flights based on the type of operation, environment, aircraft used, crew training, and overall operating experience (ALARP).







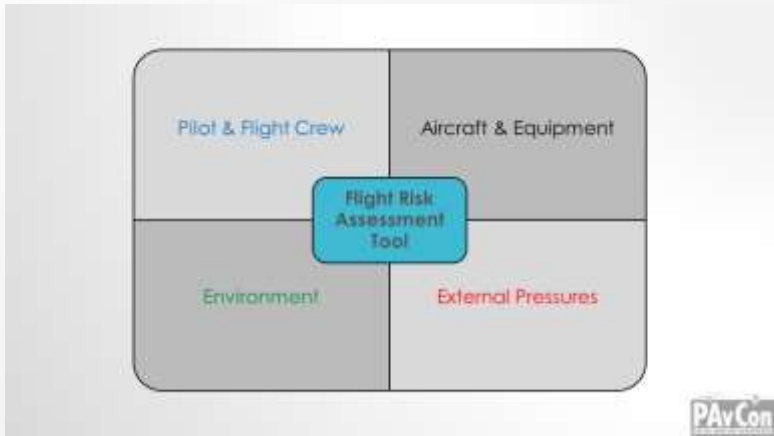




# FLIGHT RISK ASSESSMENT TOOLS

HAZARD IDENTIFICATION - PAVE  
RISK PERCEPTION  
HAZARD MITIGATION  
RISK ACCEPTANCE  
RISK - ALARP

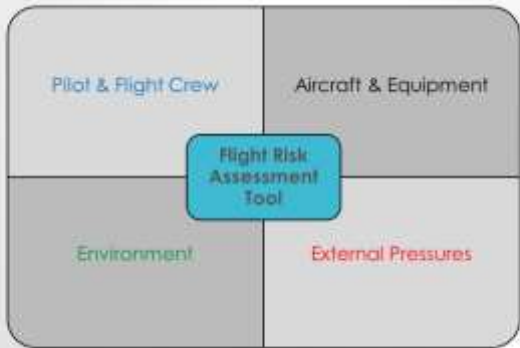




# DESIGN

## First Generation- Hard Copy

1. Cumulative summary of PAVE risk factors
2. Static & Dynamic Data Points
3. Mitigations



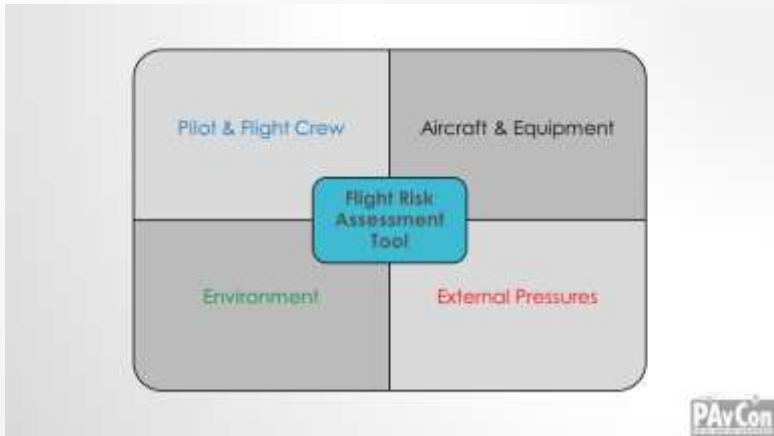
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# DESIGN

## Second Generation- Software/Apps

1. Email alerts for excessive risks
2. Customized event risk mitigations
3. Access for all personnel
4. Detailed report history & data review

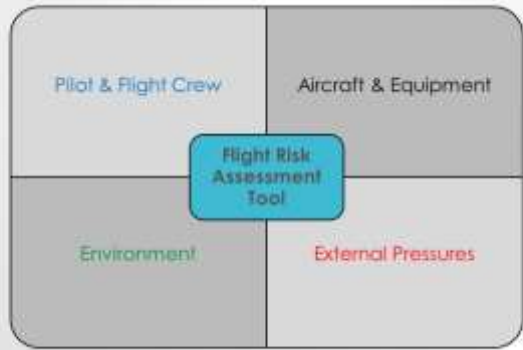




# DESIGN

## Third Generation- Integrated Software

1. Integrated into flight operations systems (FOS)
2. Large number data points
3. Automated entry of crew qualifications, FRMS data, weather, airspace, maintenance, Notams
4. Better metadata capture analysis



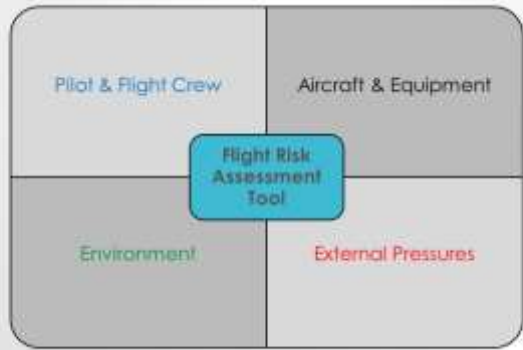
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# DESIGN

Consider Unique Organizational Operating Environments and Leading Causes of Accidents in Your FRAT Development

The Top 10 Leading Causes of Fatal General Aviation Accidents US 2001-2016:

1. Loss of Control Inflight
2. Controlled Flight Into Terrain
3. System Component Failure – Powerplant
4. Fuel Related
5. Unknown or Undetermined
6. System Component Failure – Non-Powerplant
7. Unintended Flight Into IMC
8. Midair Collisions
9. Low-Altitude Operations
10. Other



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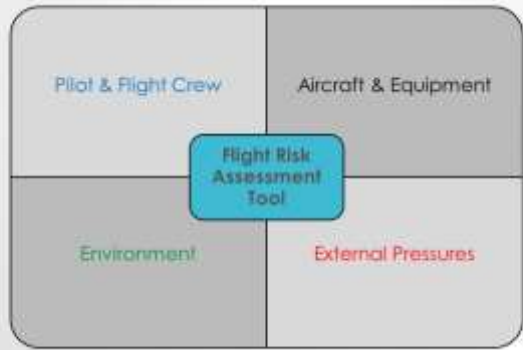
# DESIGN

Pilot & Flight Crew Datapoints  
*Human Factors in 80% accidents*

1. Illness
2. Medications (OTC)
3. Stress
4. Alcohol
5. Fatigue
6. Emotional Status
7. Flight & Duty Periods (FRMS)
8. Aircraft Flight Currency & Degradation
9. Mission Qualification & Currency
10. Total Flight & Mission Experience
11. Experience in Make and Model
12. Experience as a Crew
13. Dual/Single Pilot Operations (30%)\*
14. Mitigations

\* 2018 NBAA Top Safety Focus Areas | NBAA  
- National Business Aviation Association



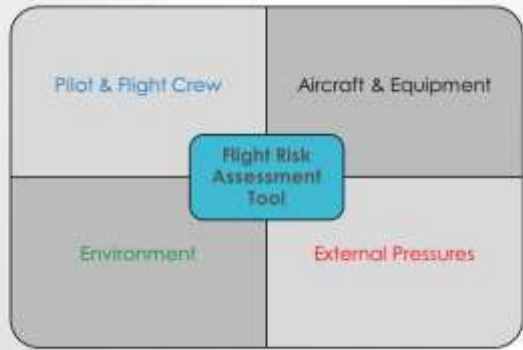


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1. New or Upgraded Aircraft & Equipment
2. Appropriate Mission Equipment
3. Performance/HOGE in Flight Conditions
4. Performance/Weight & Balance
5. Fuel Endurance
6. Adequate Performance Safety Margins
7. Maintenance Discrepancies & Limitations
8. Recent Maintenance Requiring Disassembly
9. Currency of NavData
10. Mitigations

# DESIGN

Aircraft & Equipment Datapoints

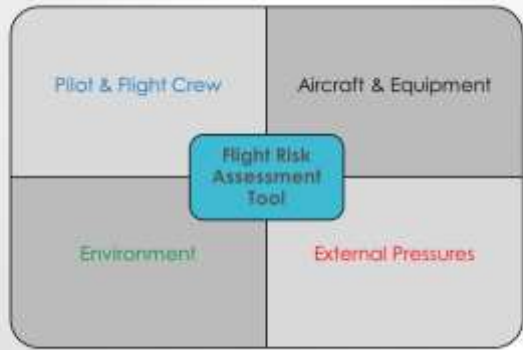


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1. Weather- Ceiling
2. Weather- Visibility
3. Weather- Wind & Turbulence
4. Weather- Frontal/Convective/Thunderstorms
5. Weather- Icing
6. Terrain- Urban, Rural, Remote, Mountainous
7. Airspace, Airport and ATC Capabilities
8. Multi Aircraft & UAS Responses
9. SOP & Individual Crew Restrictions
10. Time of Day- Night- NVG
11. Mitigations

# DESIGN

Environment Datapoints

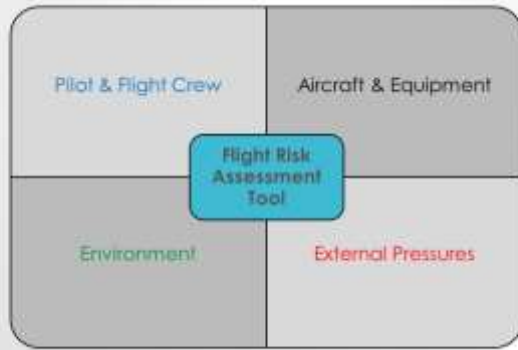


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1. Critical Incidents- Threat to Life
2. Command Structure Expectations
3. Ground Personnel Expectations
4. Crew Expectations
5. Self Expectations
6. Organizational Safety Policy "Turn Down Policy"
7. Organizational Just Safety Culture
8. Application of SOP and Personal Limitations
9. Mitigations

# DESIGN

External Pressures Datapoints



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# DESIGN

Data Points &  
Assigned Score

1. Illness
2. Medications (OTC)
3. Stress
4. Alcohol
5. Fatigue
6. Emotional Status
7. Flight & Duty Periods (FRMS)
8. Aircraft Flight Currency & Degradation
9. Mission Qualification & Currency
10. Total Flight & Mission Experience
11. Experience in Make and Model
12. Experience as a Crew
13. New or Upgraded Aircraft & Equipment
14. Appropriate Mission Equipment
15. Performance/HOGE in Flight Conditions
16. Performance/Weight & Balance
17. Fuel Endurance
18. Adequate Performance Safety Margins
19. Maintenance Discrepancies & Limitations
20. Recent Maintenance Requiring Disassembly
21. Currency of NavData
22. Weather- Ceiling
23. Weather- Visibility
24. Weather- Wind & Turbulence
25. Weather- Frontal/Convective/Thunderstorms
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27. Terrain- Urban, Rural, Remote, Mountainous
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39. Application of SOP and Personal Limitations

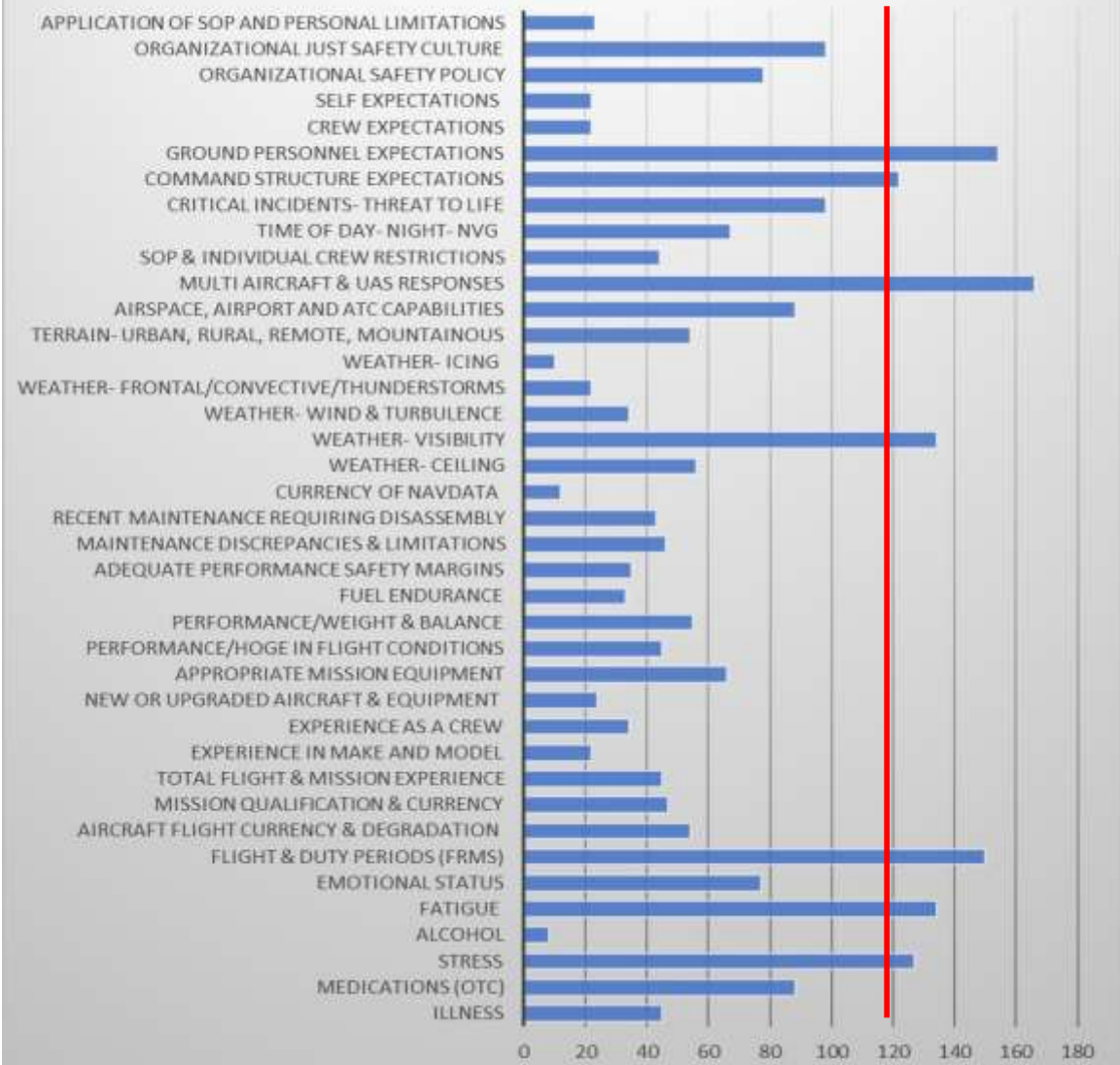


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# DESIGN

Data Points  
Risk Evaluation

## FRAT Analysis Base A Sea Level Urban



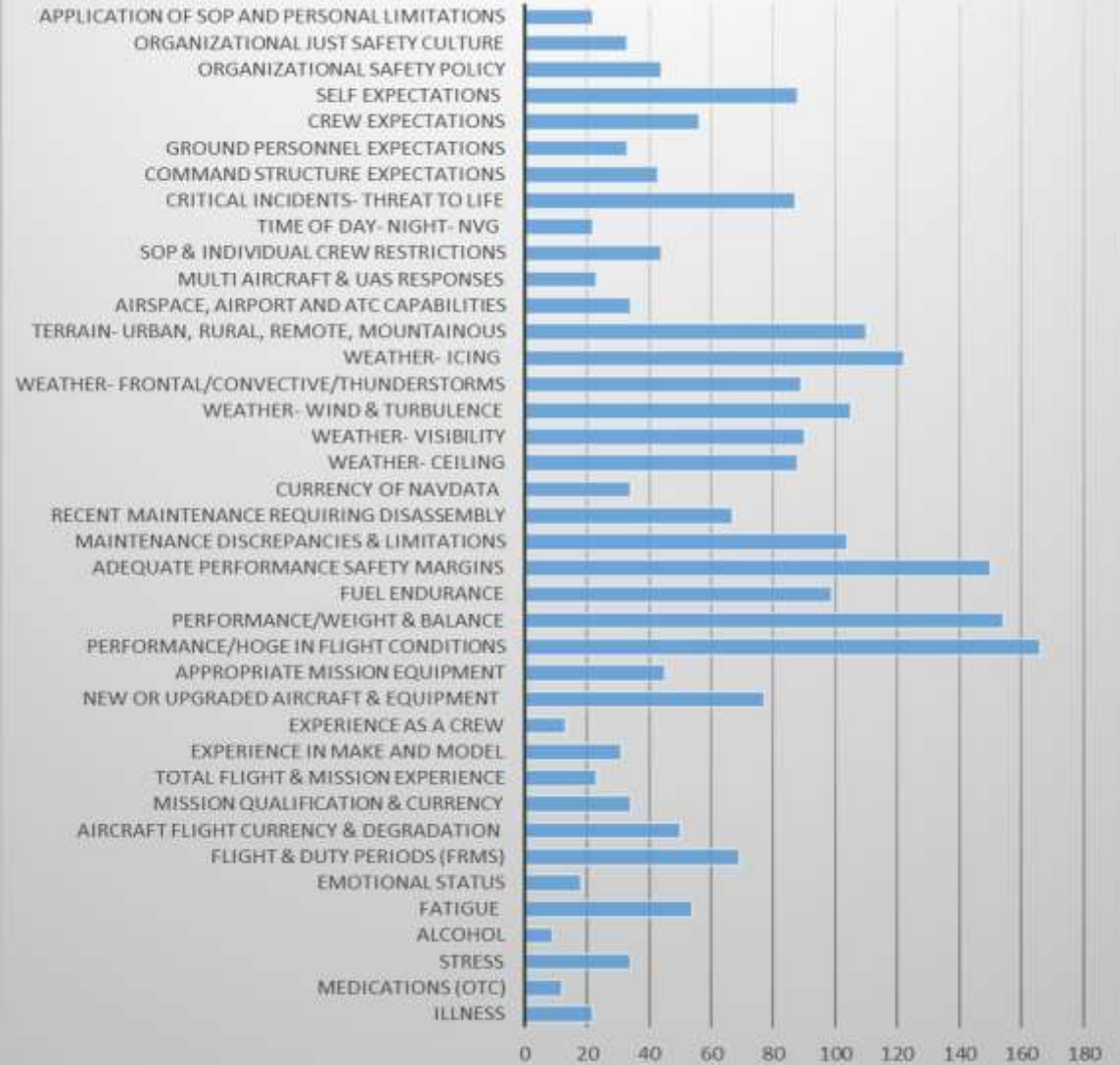


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# DESIGN

Data Points  
Risk Evaluation

## FRAT Analysis Base B Mountainous Remote



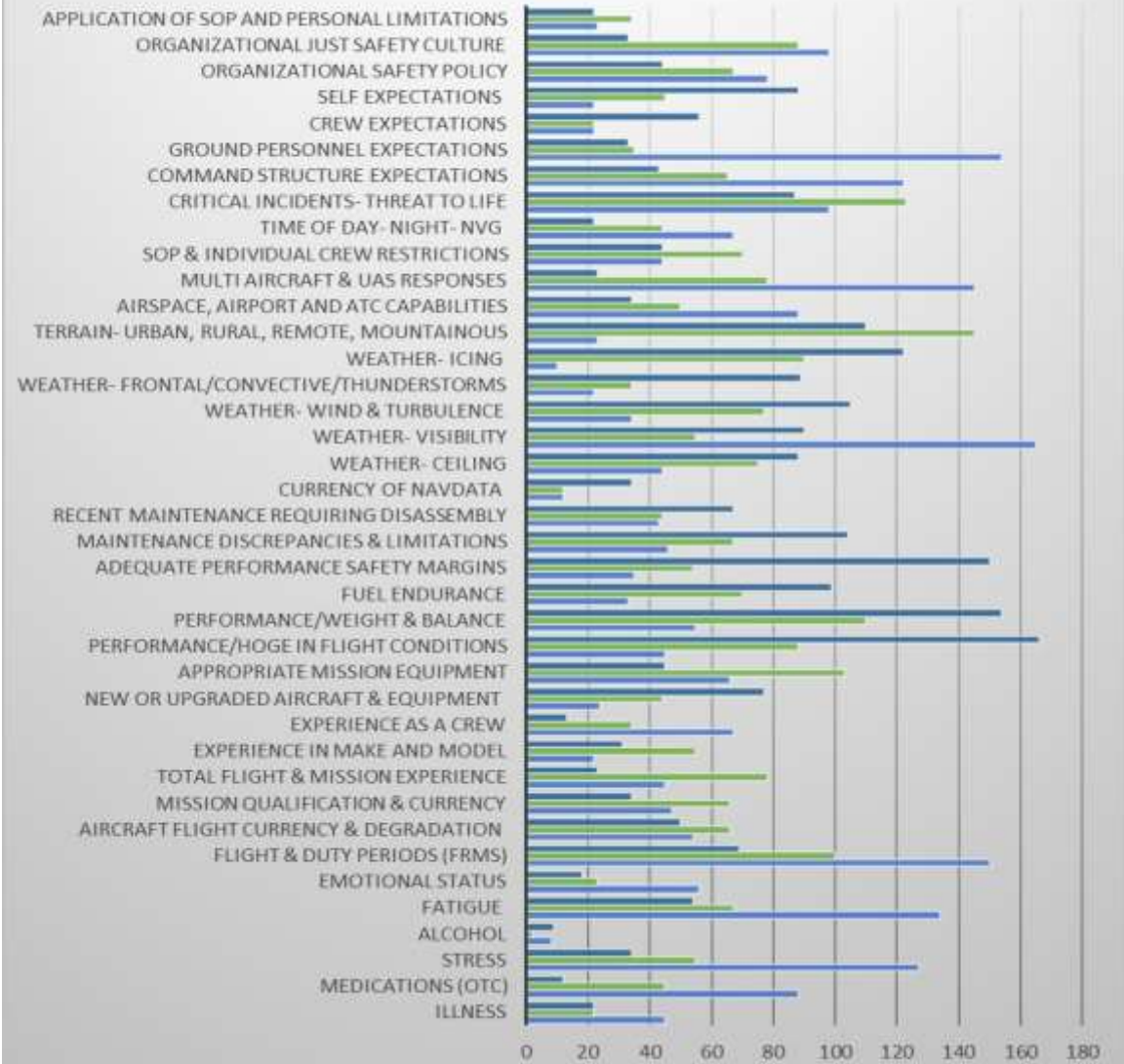


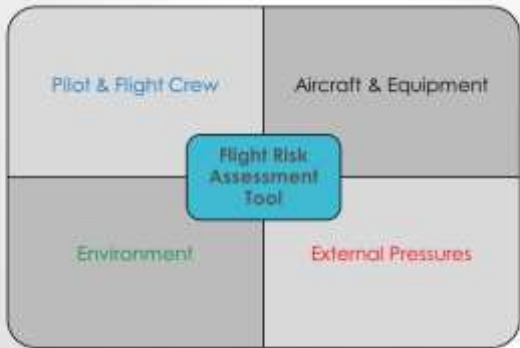
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# DESIGN

Data Points  
Risk Evaluation

## FRAT Data Comparisons Base A - B - C

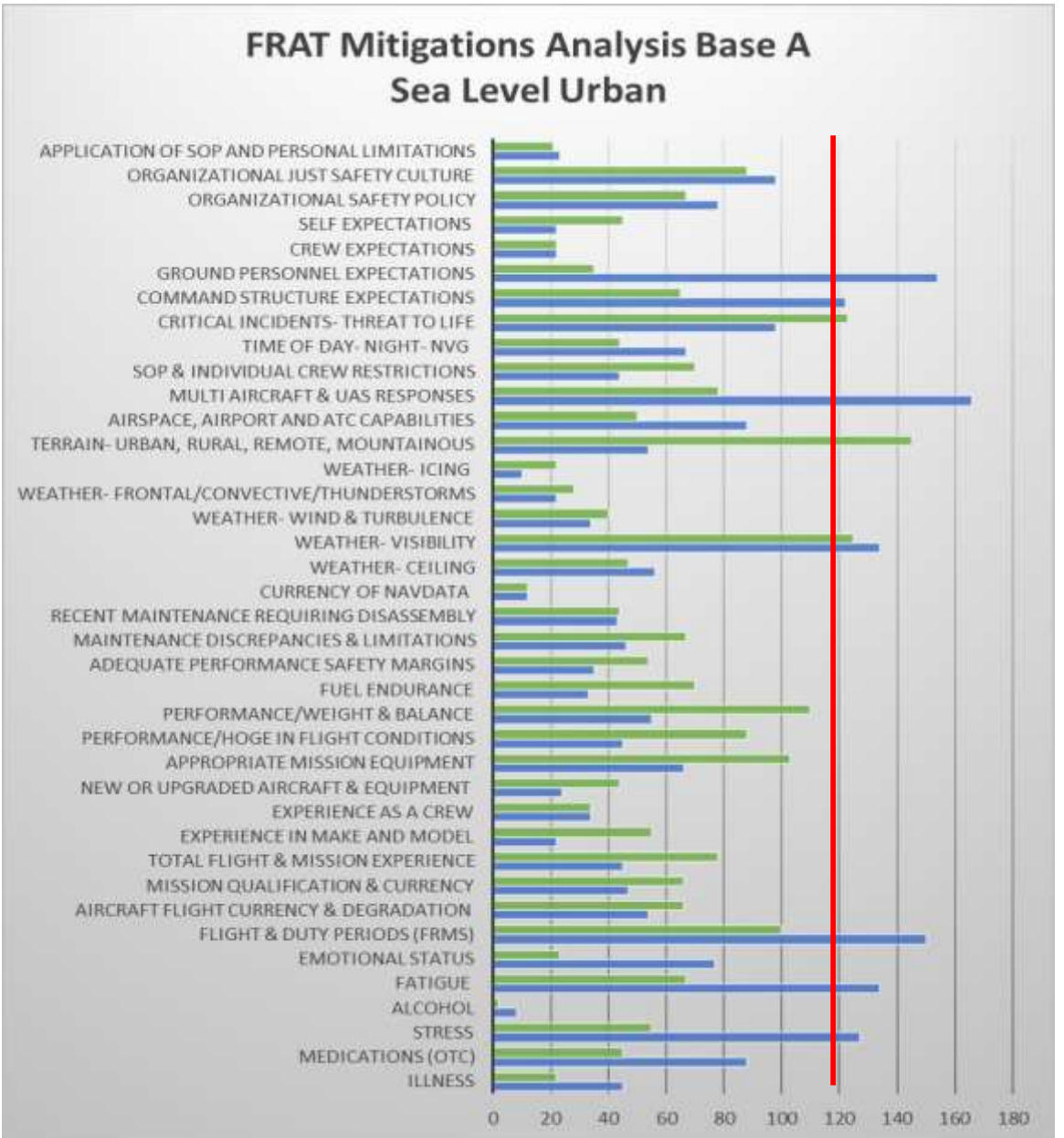




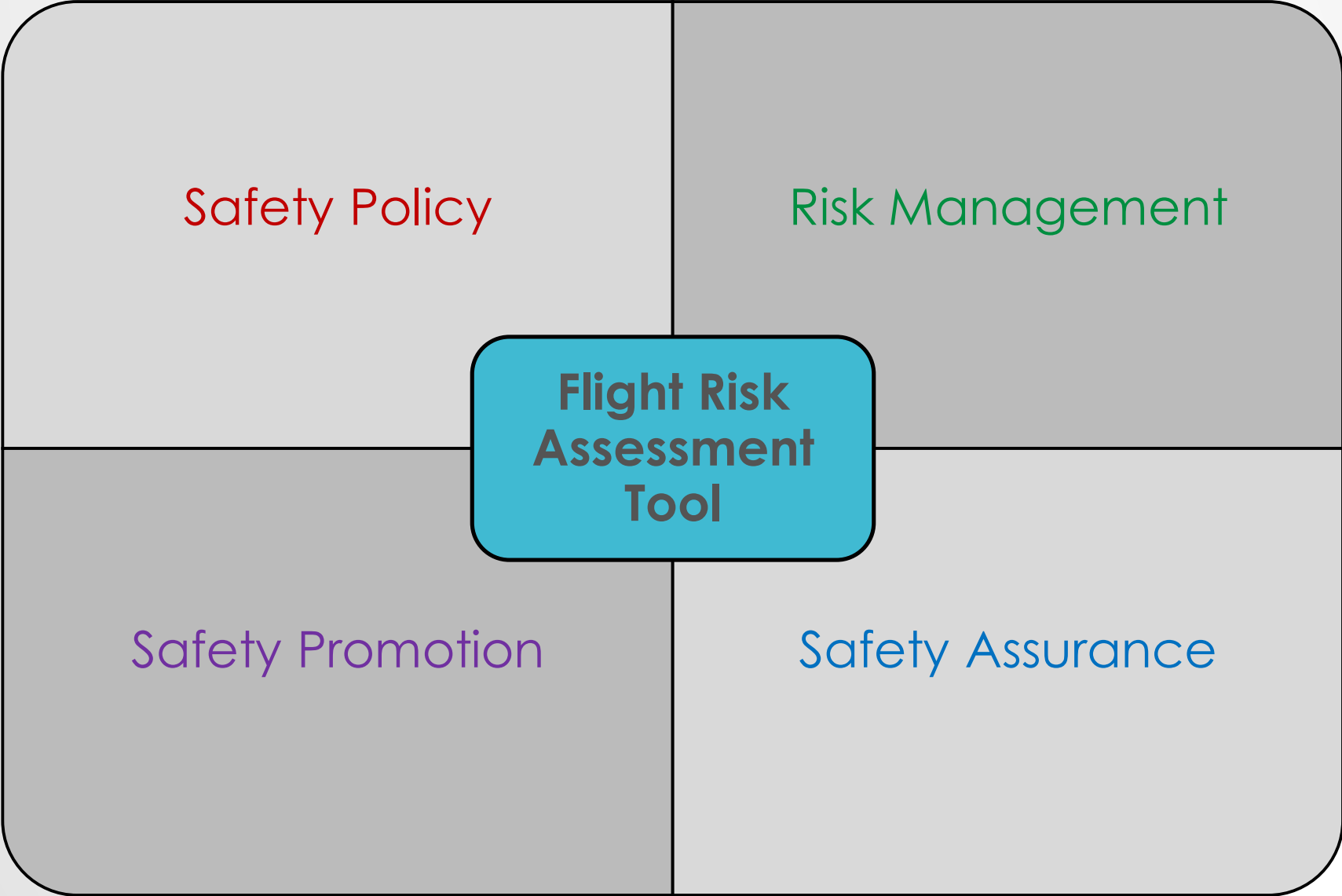
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# DESIGN

Data Points  
Risk Evaluation







# FOUR PILLARS OF SMS

- **FRAT in Safety Policy**

- Every type of management system must define **policies**, **procedures** and **organizational structures** to accomplish its goals. An SMS must have policies and procedures in place that **explicitly describe** responsibility, authority, accountability and **expectations**. Most importantly, safety must be a core value.

- *Defines When/How Flight Risk Assessments Are Completed, Responsibilities*
- *Only Non-Standard Operations/Conditions?*
- *First Flight Only/ All Flights/ First Flight & Substantive Changes?*
- *First Flight/ In-Fight Dynamic Review (Mission Change) & Post Flight Entry*
- *Policies For Metadata Collection/ Use Strictly for Safety Improvements*

# FOUR PILLARS OF SMS

- **FRAT in Safety Risk Management**

- A formal system of hazard identification and management is fundamental in controlling an acceptable level of risk. A well-designed risk management system describes operational processes across department and organizational boundaries, identifies key hazards and measures them, methodically assesses risk, and implements controls to mitigate risk.
  - *Appropriate Datapoints, Risk Scores & Mitigations for Organization*
  - *Single or Multi Base/Shift Organizational Considerations*
  - *Hazards & Conditions Unique to Base Locations and AOR*
  - *Allow Operators, Pilots and Crews to Foresee & Mitigate Unique Flight Risks*
  - *Develop Immediate (tactical) and Long Term (strategic) Mitigations*

# FOUR PILLARS OF SMS

- **FRAT in Safety Assurance**
- Policies, process **measures**, assessments and controls are in place. The organization must incorporate regular **data collection, analysis, assessment and management review** to **assure safety goals** are being **achieved**. Solid change management processes must be in place to assure the system is **able to adapt**.
  - *Meta-Data Identifies Highest Risks & Trends*
  - *Meta-Data Helps Confirm Effective Mitigations & Mitigation Skills*
  - *Quantifies Success in Achieving Key Performance Indicators (KPI's)*
  - *Helps Guide Data Point, Risk Score Development & FRAT Evolution*

# FOUR PILLARS OF SMS

- **FRAT in Safety Promotion**
- The organization must continually **promote**, **train** and **communicate** safety as a core value with practices that support a sound safety culture.
  - *Communicate Immediate and Long Term Mitigation Results*
  - *Demonstrate Effectiveness of Data in Implementing/Driving Change*
  - *Current Feedback to Stakeholders at all Levels*
  - *Helps Demonstrate Validity of SMS Program & Promote User “Buy-In”*
  - *Data Provides Training Material for Forming Mitigation Strategies*



# FLIGHT RISK ASSESSMENT TOOLS

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