

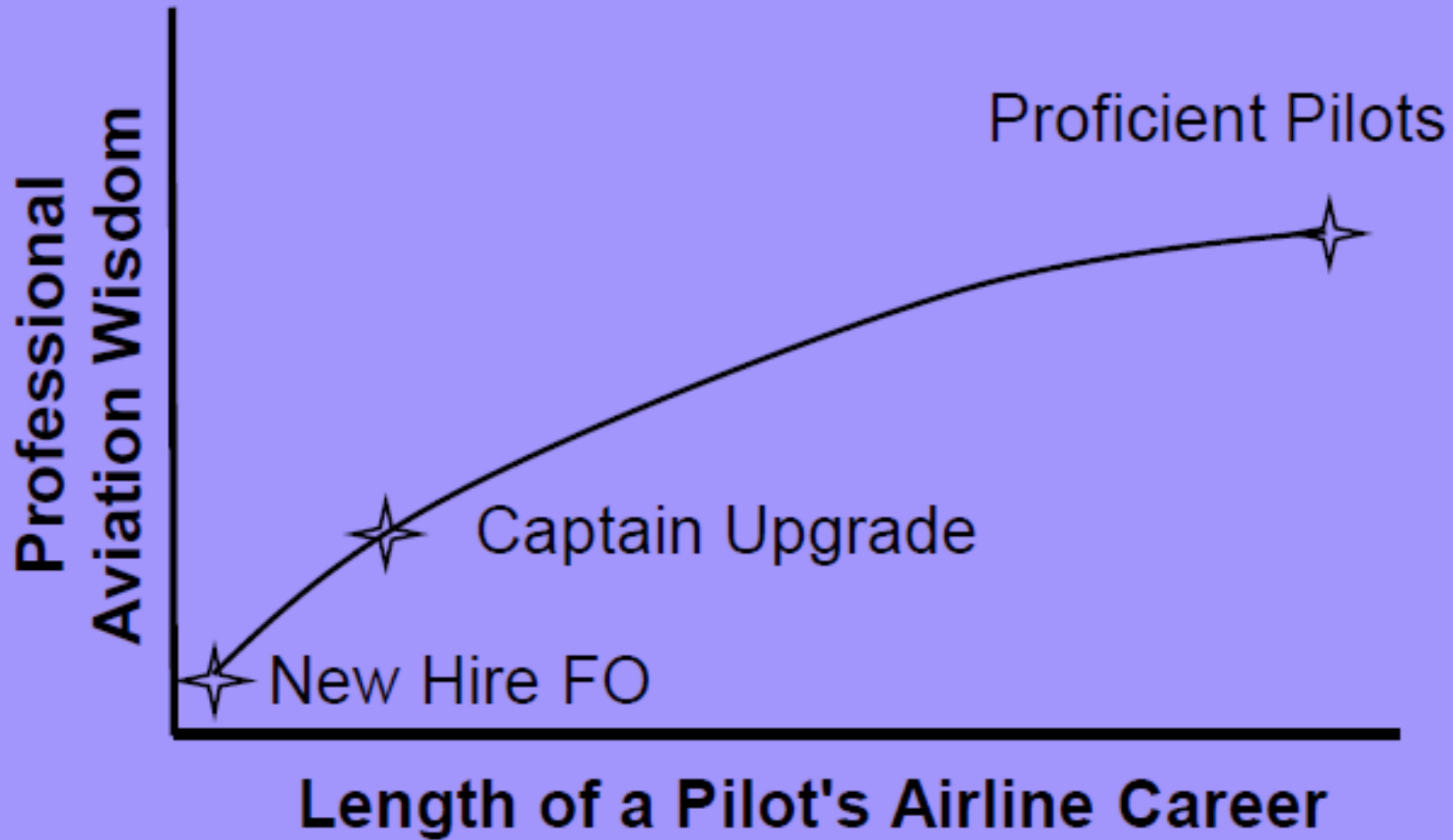
The Master Class Path

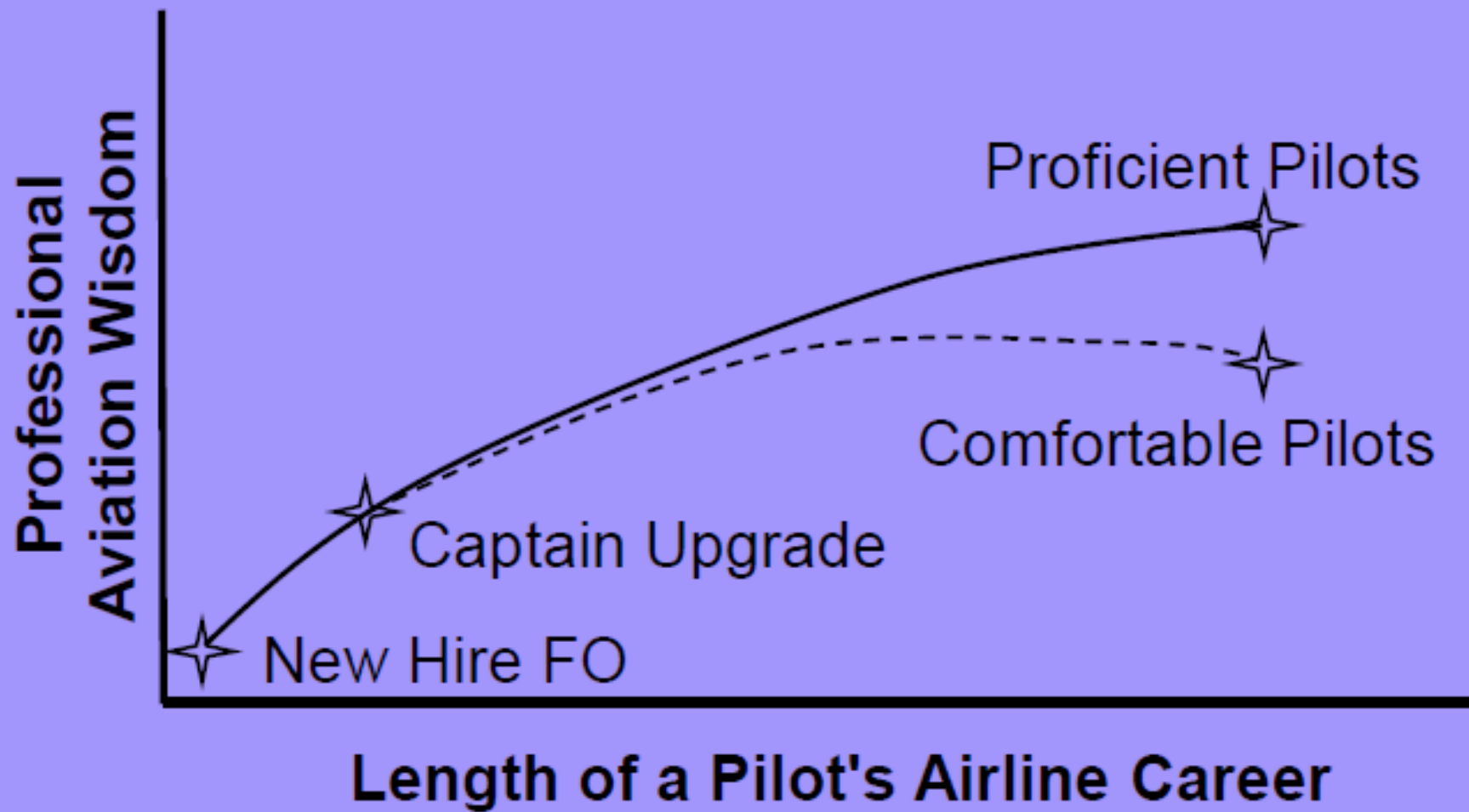
Raising Aviation Professionalism From Proficiency to Excellence

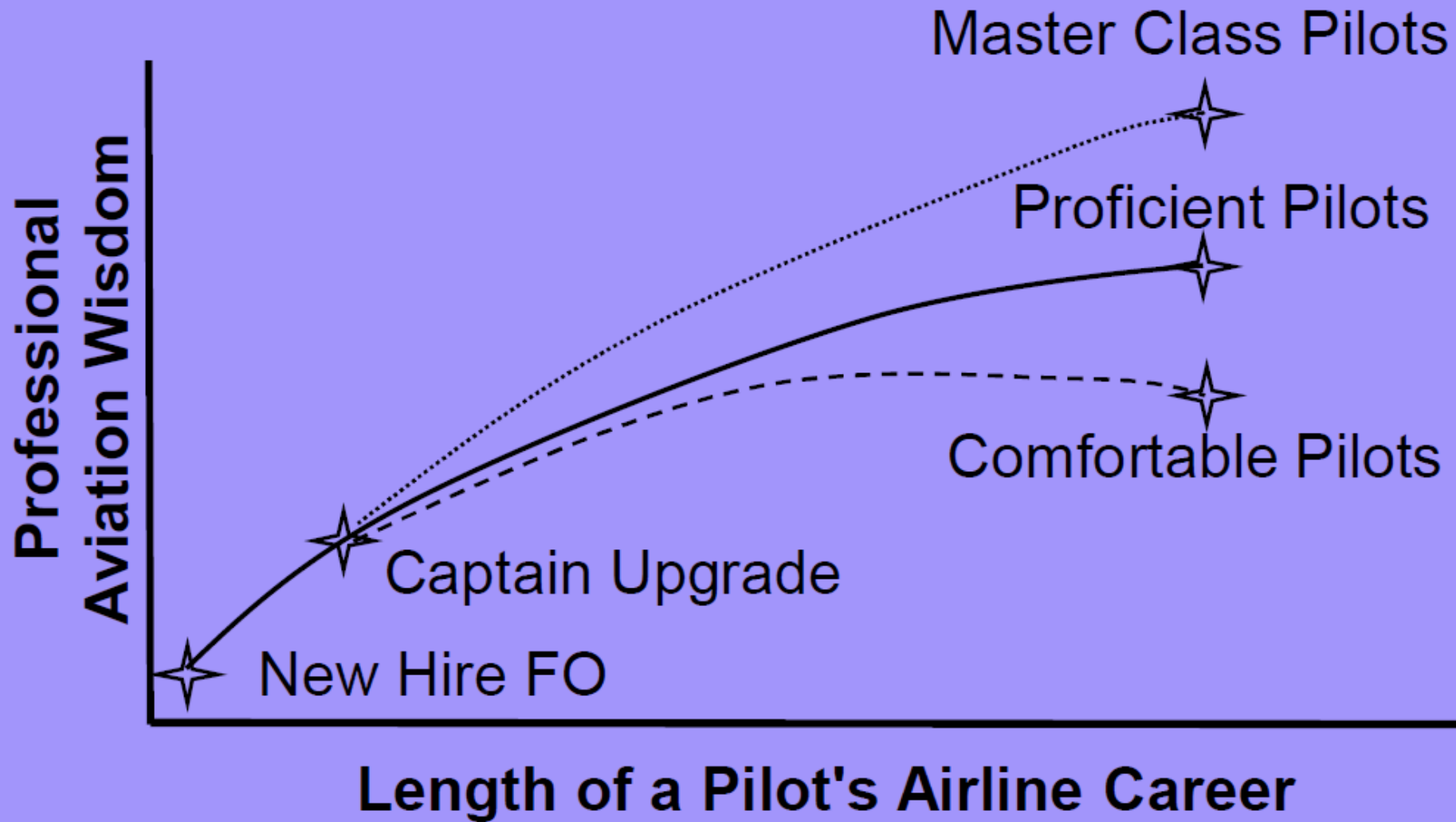
Captain Steve Swauger – SWA retired

Two main points of this session

- How the Comfort Zone mindset sustains the sticky problems of professional aviation
- How promoting the Master Class mindset reverses these problems and energizes the growth of professional aviation wisdom





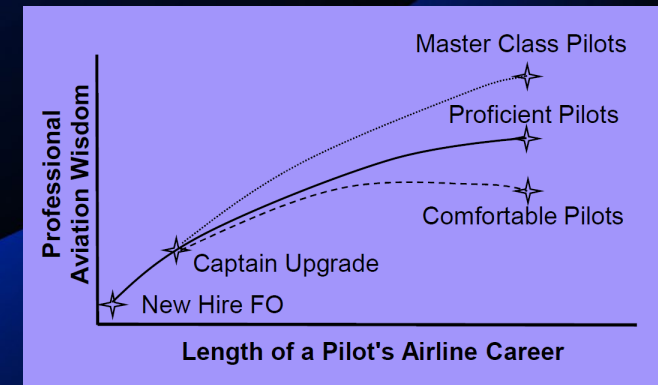


The forces that promote comfort zone

- Job proficiency – encourages laxity
- Pass our checkrides – sets the lowest standard
- Everyday success – promotes expectation bias
- Career goal achievement – stifles ambition
- Money – redirecting their attention toward outside interests

What happens in the gap?

- More vulnerable to error and mishap
- More susceptible to surprise/startle
- Less motivated and less happy
- More likely to mis-apply priorities
- Bottom line – the gap shows where we perpetuate the sticky problems of aviation



Master Class advantage areas

1. Attention focus
2. Game plan selection and modification
3. Expectation bias
4. Preparation and situational awareness
5. Drift in everyday practice
6. Adopting an appropriate mindset
7. Professional growth

1. Attention Focus

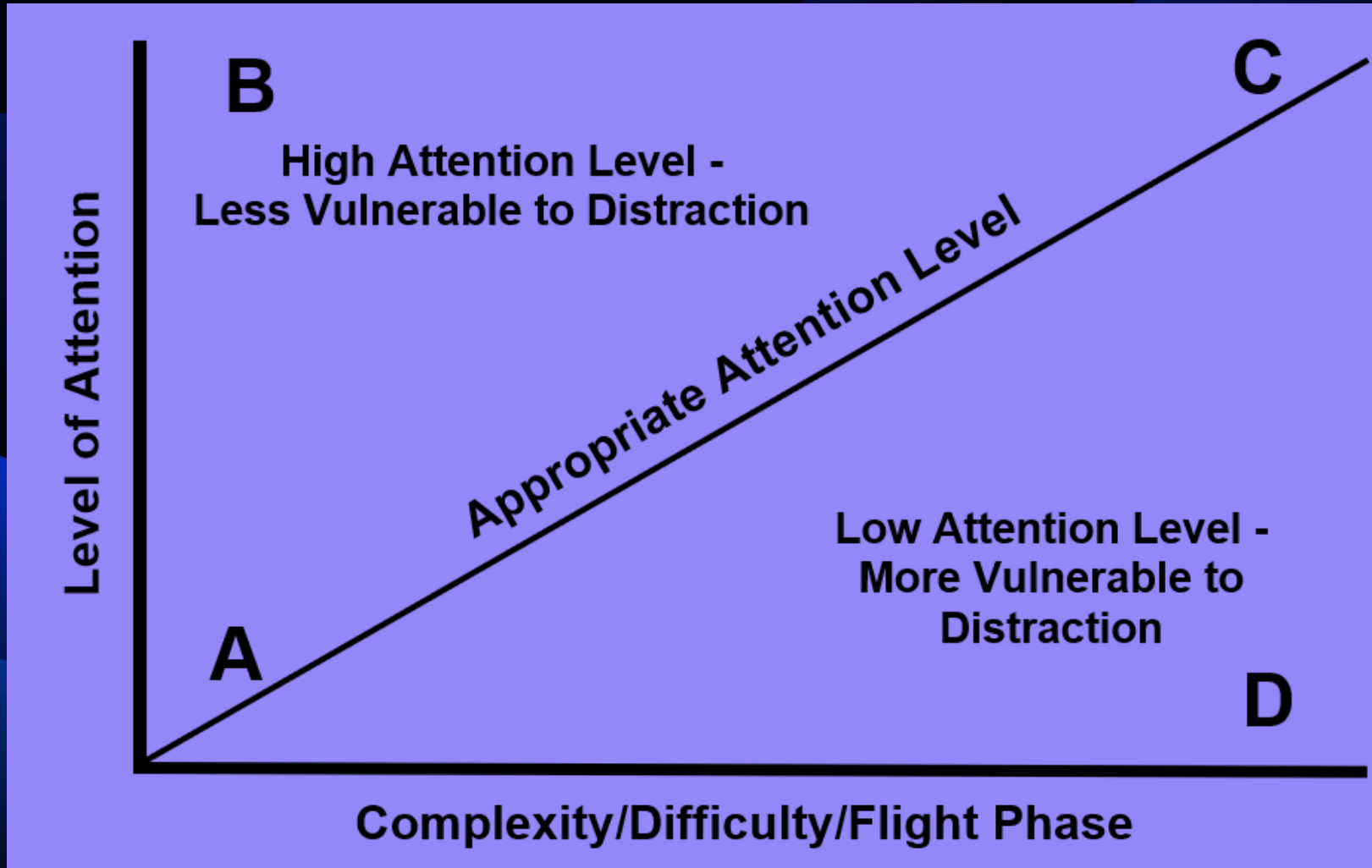
Comfort Zone

Attention level becomes aligned with perceived difficulty of the task – “good enough”

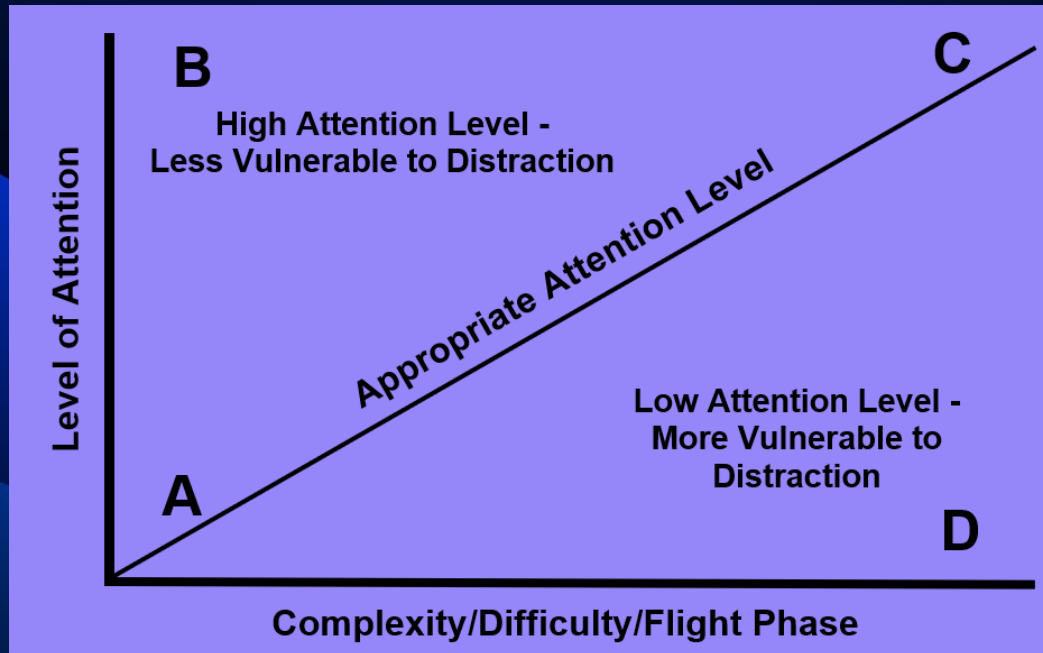
Master Class Zone

Attention level is aligned appropriately for the phase of the flight or complexity of the situation

Appropriate attention level



Appropriate attention level



Points A and C - Effects	Point D - Effects
Shorter Startle Reaction	Longer Startle Reaction
Quicker Analysis	Slower Analysis
Accurate Plan Recovery	Inaccurate Plan Recovery
Operational Flow Recovery	Operational Flow Disruption
Active Flight Path Monitoring	Flight Path Inattention
PF/PM Role Integrity	PF/PM Role Breakdown
Actions by Choice	Actions by Habit

NASA ASRS report database

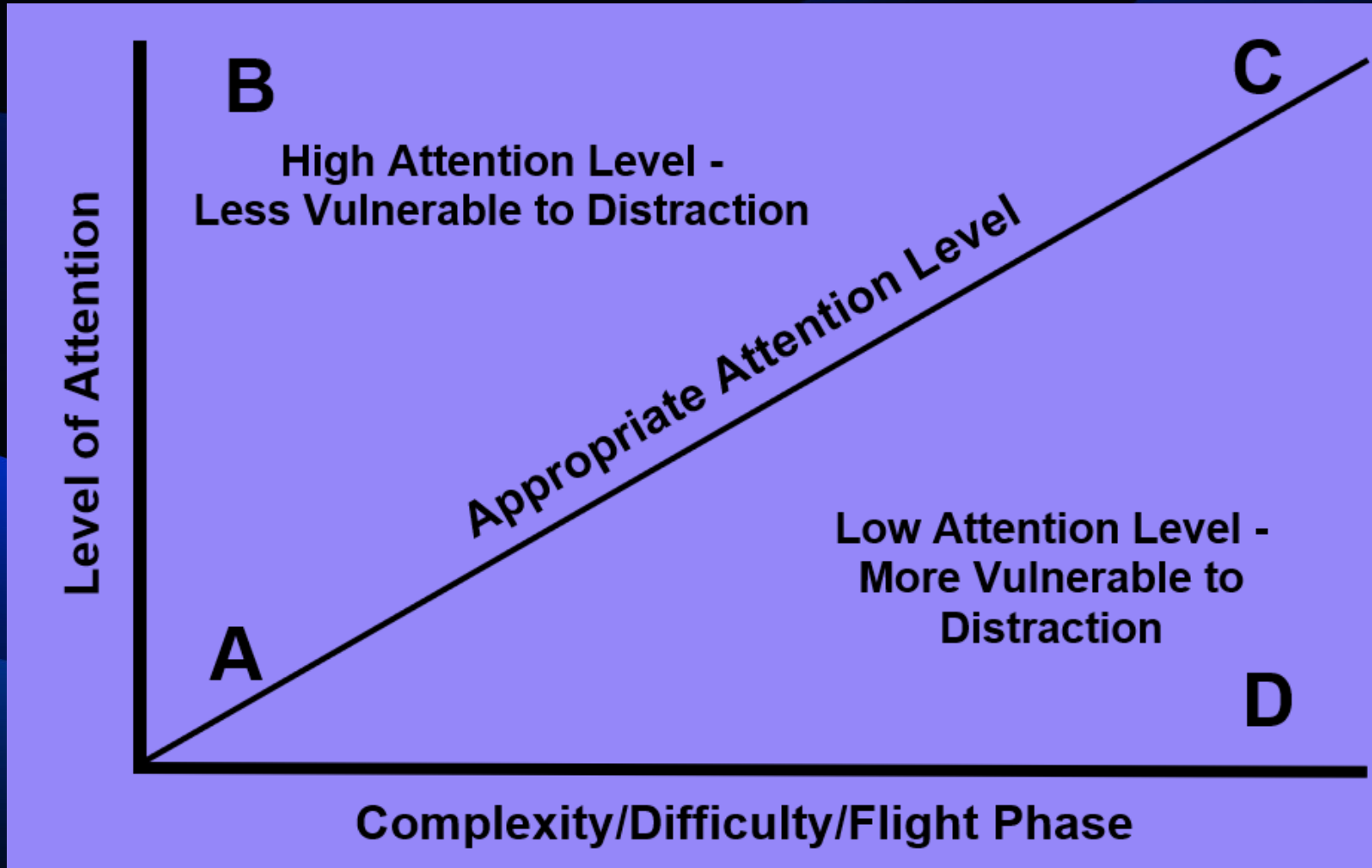
- Over 2,000,000 reports
- Sources/Incentives
- Fully searchable by category and words
- Deidentified
- Public domain
- How to read and use the reports:
 - Hindsight bias and self-blame
 - Need to see the story beneath the words
 - Clarify language

We were number three for takeoff, third day of a three-day trip. Assigned Runway XXR. Aircraft ahead was cleared for takeoff, and in a moment of complacency, I taxied across the first hold short line. First indication that I had done it was from the tower controller asking, “Flight ABC, where're ya goin’.” We stopped short of the Runway XXR second hold short line and we're cleared for takeoff shortly thereafter.

Cause - Simple complacency [laxity], loss of situational awareness, and a false sense of comfort. I have flown in and out of ZZZ on XXR many times. I know the hold short lines and their significance at XXR/YY.

I should have (and will in the future) emphasized the XXR/YY hotspot more in the departure briefing and should have cultivated more self-awareness during the taxi. I simply followed the aircraft in front of me in a momentary loss of situational awareness. (ASRS #1756647)

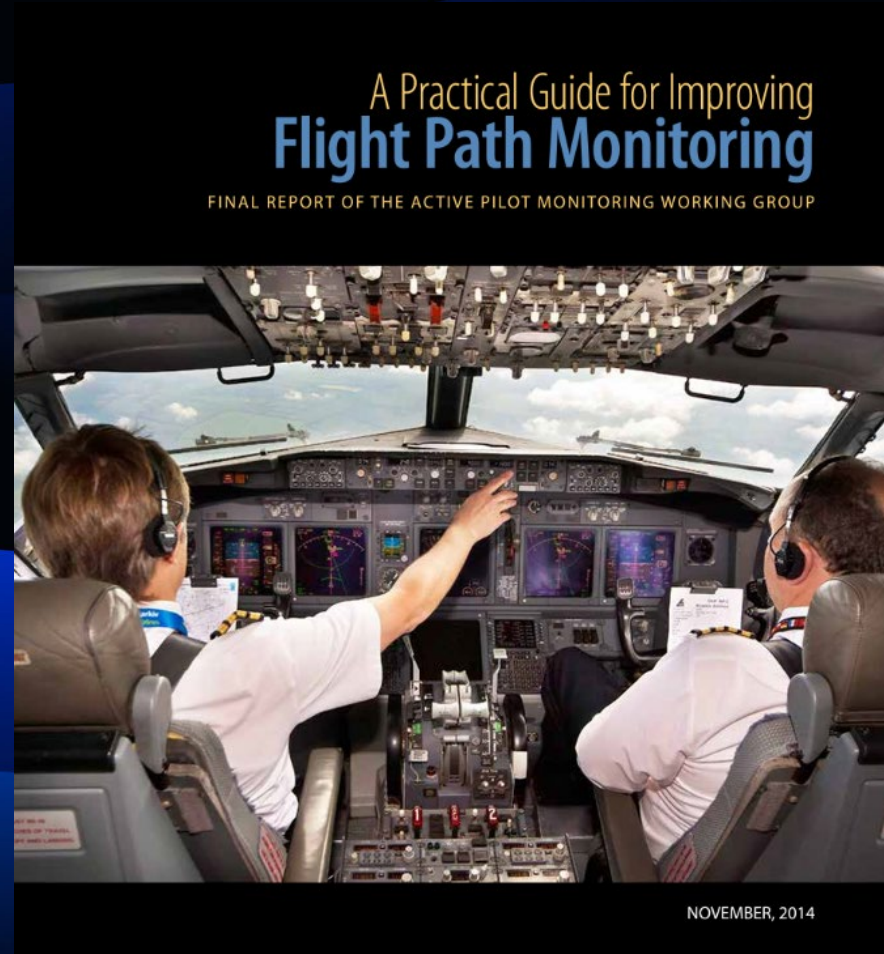
Where was their attention level?



In the ready position



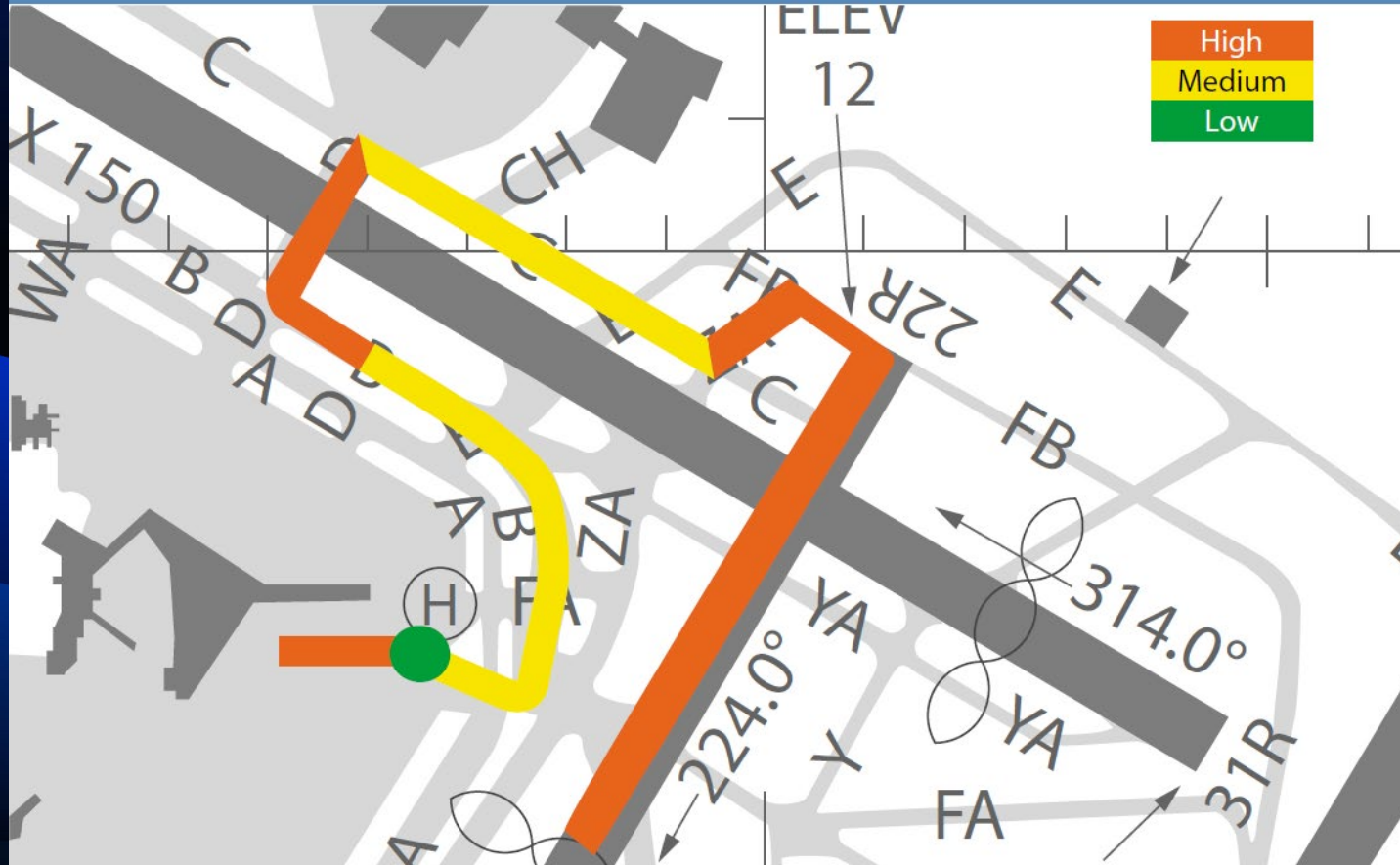
Dynamic movement and Areas of Vulnerability



Free download from the
Flight Safety Foundation

Ground dynamic movement and AOVs

Areas of Vulnerability (AOV) to Flight Path Deviation, Ground Profile Examples



PGFIPM, p. 19

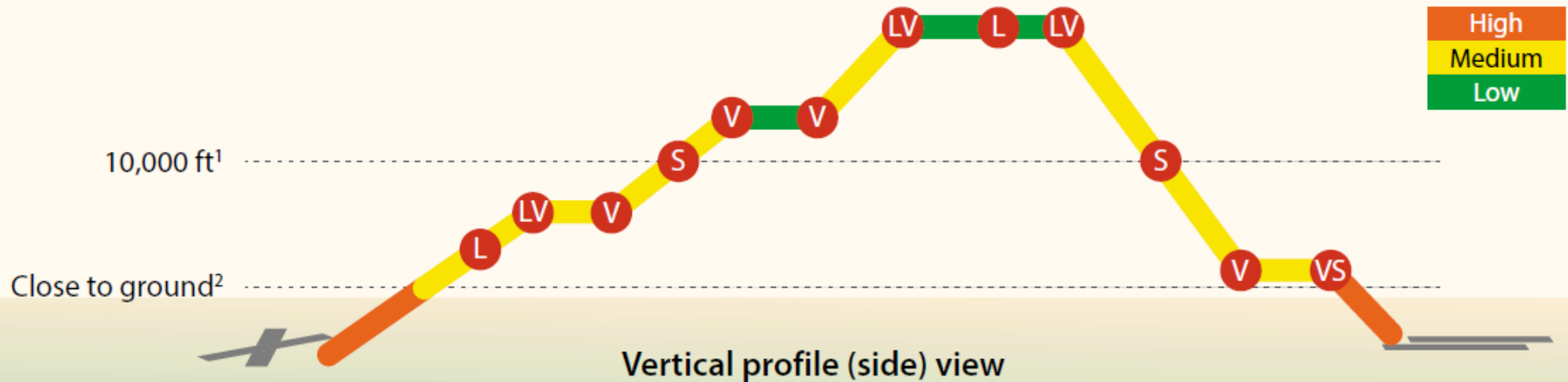
I was the Captain on Flight We were already delayed by about one hour while Maintenance was working on writing up an MEL for a Wing A/I Fault message. Once that was complete, we pushed and had to go through [another] long MEL procedure after start before we could taxi. We then called for taxi and ATC gave us instructions to Runway XX at X via Y XYR approach Z. We had originally planned for Runway XZL so we had to do a runway change. I proceeded to taxi [on an incorrect taxi routing because I] had misinterpreted the taxi chart. At the time, the FO was extremely busy working on setting up the aircraft for the runway change. As soon as I crossed [an active runway, I] stopped the aircraft short of the [assigned] runway. ... [We discussed our error with ATC and were given a new taxi routing.] We continued taxiing and completed the flight with no other issues.

There were many factors at play as both I and the FO were on our second leg of the trip and had not flown for a couple of months. We were delayed with maintenance and had the long MEL procedure to do after we pushed, we then got distracted with the runway change, so we were extremely busy.

This is no excuse but a reminder that I need to make sure to slow down and make sure everything is done correctly. There was also a lack of communication between [me] and the FO as I should have made sure the FO understood our taxi clearance before proceeding. ... Ultimately, I made the mistake and will definitely slow down and not rush and make sure everyone is on the same page in the future. (ASRS #1748156)

Airborne dynamic flight and AOVs

Areas of Vulnerability (AOV) to Flight Path Deviation, In-Flight Profile Examples



L Lateral trajectory change **V** Vertical trajectory change **S** Speed change

Notes:

- 10,000 ft is used in the United States as the boundary altitude for sterile cockpit rules and for the 250 KIAS speed restriction (both required below 10,000 ft). For the purpose of the AOV model, an altitude of other than 10,000 ft may be chosen, but it is suggested that this boundary match the use of sterile cockpit rules for your operator (or nation/state) for ease of operational applicability by flight crews
- "Close to ground" may be defined by the operator, but it is suggested that this be an altitude no less than (a) 1,500 ft AGL or (b) the altitude of the surrounding terrain (if terrain threats exist within 5 nm [9 km] of the flight path), whichever is higher.

I was the First Officer... Captain was flying this leg, and I was Pilot Monitoring. We had taken off from Runway XYR out of ZZZ. We were cleared to climb via the ZZZZZ RNAV Departure (FL190). As part of our pre-take off procedures, Captain briefed the entire departure. Captain was hand-flying the aircraft during the climbout. As we approached waypoint ZZZZZ at an altitude of about 11,000 ft, Captain remarked about the autothrottles not advancing forward to maintain the selected climb airspeed. I immediately focused on the Flight Mode Annunciator trying to figure out why the autothrottles started to reduce thrust. Almost at the same at the time, ATC asked us if we were going to level off at 11,000 ft. That's when Captain and I realized that waypoint ZZZZZ has an altitude crossing restriction at or below 11,000 ft. By that time, I noticed that we had climbed to an altitude of 11,500 ft. Captain immediately descended 11,000 ft and we crossed ZZZZZ at 11,000 ft. ... (ASRS #2098658)

2. Game plan selection/modification

Comfort Zone

Diminished repertoire of game plans and limited skillset – use more force

Master Class Zone

Expanded repertoire of game plans and rich skillset – choose more power

Game plan selection/modification

- Recognition Primed Decision Making (RPDM):
 - Observed indications match recognized patterns.
 - Patterns activate action scripts.
 - Action scripts are assessed through mental simulation.
 - Mental simulation is driven by mental models.

(Gary Klein)
- Simply stated – RPDM guides how we apply decision making at the two extremes.

Game plan selection/modification continuum

Familiar/Comfortable Situations

Crossover zone

Unfamiliar/Unexpected Situations

Familiar game plans match

Familiar game plans work with some force

Familiar game plans need significant force

Familiar game plans need to be adapted

Innovative game plans are needed

CLEM'S BAD DAY – A VISUAL APPROACH GONE WRONG

Clem is a proficient, typical line-flying Captain. One day, he was on vectors for an airport with a fairly short runway. Earlier than he expected, ATC cleared him for a visual approach. Free to maneuver on his own and running behind schedule, he chose to press closer the field and delay configuring the aircraft. When he finally began slowing for the approach, he realized that he had misjudged his energy state. He was closer and faster than he wanted to be. He took steps to shed the excess energy. He pulled the thrust levers back to the idle stops, directed his FO to lower the landing gear, and extend maneuvering flaps. This helped. He intercepted glideslope and started down.

The approach was tight, but he felt like he could still salvage it. Then, he noticed that his speed was not decreasing as expected. He shallowed his glidepath and slowed enough to extend full flaps. At this point, he was fully configured, still fast, and trending high on glidepath. He reduced pitch to rejoin glidepath, but this caused his speed to stagnate about 20 knots fast. Running out of time and ideas, he decided that his parameters were close enough to continue. He chose to land fast and deplete the excess speed during rollout. He relied on the reported 10-knot headwind to help with slowing. Unfortunately, the winds had switched to a light tailwind by the time he reached the flare. He overcontrolled his flare. He felt that it was not bad enough to warrant a go around, so he continued even though he overflew his planned touchdown point.

Increasingly frustrated, he eased the wheels down for a smooth touchdown about 3000' down the runway. He lowered the nose, initiated reverse thrust, and engaged wheel braking. He felt normal deceleration which restored his confidence that he would successfully stop. Unfortunately, there was a latent hazard that he had not anticipated. A light rain had fallen on the airport just before his arrival. This was the first rainfall following many weeks of dry, dusty weather. While the touchdown portion of the runway appeared mostly dry, a slippery layer of water, reverted rubber deposits, and dust contaminants covered the last 2000' of the runway. Clem's first indication of this hazard began when his brakes started antiskid cycling. Next, the aircraft began sliding. He maintained aircraft alignment, but slid past the end and stopped well into the overrun. Until this event, Clem had enjoyed an unblemished safety record.

The Recognition Trap

Uncommon	Recognition Trap Error <i>Land when you shouldn't</i>	Recognized as Uncommon <i>Go-around when you should</i>
	Recognized as Common <i>Land when you should</i>	Conservative Error <i>Go around when you shouldn't</i>
Common situation	Familiar situation	Unfamiliar situation

Recognition Trap behaviors

- Misplaced/Inappropriately-weighted priorities
- Increased force to make the game plan to work out
- Trading one problem for another
- Event quickening
- Reaching the stops
- Goal switching
- Comfort zone perspectives – good enough, expectation bias, simplifying, shortcutting, and irrational optimism

Recognition Trap interview features

- Misguided judgment of safety – “I didn’t feel unsafe”
- Limited recollection of the event specifics – moved too fast
- Visual focus of attention to the detriment of other senses
- Underestimate the severity of flight parameters
- Disbelief during the event – wasted cognitive assets
- Resignation to the event trajectory – “I did all that I could”
- Discomfort with being outside of their comfort zone

3. Expectation Bias

Comfort Zone

Succumb to expectation bias by searching for profactuals

Master Class Zone

Overcome expectation bias by searching for counterfactuals

CREW CONVINCES THEMSELVES THAT THEY WERE CLEARED FOR TAKEOFF

Captain's report: ... We departed the ramp from Spot X and Ground Control assigned XXR, which was a very short taxi ... I made the Takeoff announcement, and... I taxied very slowly while the FO loaded the box with the new data, read the LEGS page aloud (from the new runway) as I followed along on the ZZZZZ 3 Departure on my iPad, and briefed the Takeoff Data. As we were in the middle of the [ramp] pad, northbound on taxiway, still fairly far from the departure end of the runway, Tower asked if we were up (on frequency). The FO said we were. Tower then asked if we would be ready at the end. The FO and I briefly checked with each other and acknowledged that, yes, we would be ready at the end.

In my recollection, I then heard “RNAV to ZZZZZ1, Cleared for Takeoff, XXR”. I chimed the flight attendants and turned on my two Landing Light switches, which is something I purposefully only do once Cleared for Takeoff. The FO finished the checklist with plenty of time (everything was properly set up before she began it), and prior to crossing the hold short line onto XXR, she said something like, “I’m pretty sure I heard Cleared for Takeoff, but do you want me to verify with them?” I looked at my Landing Lights, saw that I had moved them to the ON position, which I “only do” once cleared for Takeoff, and thought I specifically heard “RNAV to ZZZZZ1, Cleared for Takeoff.” So, I said to her, “No. I don’t need you to verify. I heard Cleared for Takeoff, too... But please... verify if you want to! Do you want to?” She said something like, “No, I think we’re good. We both heard the same thing.” I said something like, “I specifically remember hearing ‘RNAV to ZZZZZ1’, which they never say until they clear us for Takeoff. We’re okay.” ... (ASRS #1769610)

What fuels expectation bias?

- Consistent success – pattern match with past successful game plans
- For unfamiliar situations – reliance on experience and gut-feel
- Rationalization – search for profactuals
- Neglecting to preserve an escape option

CREW PUSHES THEIR GAME PLAN IN ADVERSE CONDITIONS RESULTING IN AIRCRAFT DAMAGE

Captain's report: Taking vectors for ILS approach to RWY 20, we called field in sight at 10 miles turning final. Cleared to land at the 5-mile fix and Tower began to give us windshear alerts on approach end of RWY 02 [The opposite end of the landing runway]. Fully configured, we continued with the approach with no windshear indications through 1,000'. Descending through 500', the First Officer clicked off autopilot and began to feel some wind gusts. Somewhere around 200' we experienced a 20-knot gain followed by a quick high-speed clacker.

While correcting and beginning landing flare, we received windshear caution alert just prior to over the numbers. A go around was our trained procedure for these indications, yet I felt we were so close to touchdown that a transition to climb would have put us in a precarious state, so I stated, “continue” to First Officer. Floating and trying to maintain airspeed, we dropped on the runway with a hard landing. The right main gear touching down first causing a whiplash effect on the left wing. We rolled out and exited runway as normal. Taxied to the gate and reported our windshear to Tower as a 20-knot gain at around 100’.

I asked First Officer to check [the gear] for any indication of the hard landing and to our surprise, we found the left wing damaged at the trailing edge of the outboard flap and wing tip below the winglet.

Our aircraft arrived in the undesired state of flying in low level windshear. We continued an approach we had made many times before in very similar conditions and were looking for cues to discontinue approach. We got to a point, perhaps so close to landing, that the threat of windshear was not going to keep us from landing. I, as Captain, felt that the sudden low level windshear we encountered was maybe too much to overcome and simply landed the plane. Take note of this incident and realize that although we operate in windshear conditions regularly, it can become strong enough to alter flight at low levels to a point where no recovery is possible. It is our responsibility as pilots to see the windshear clues and either abort the maneuver or not attempt it. We failed to do so with the untimely clues we received and resulted in aircraft damage. Teach not only escape guidance, but when to simply not attempt it. I operated cautiously [with respect] to weather all the time, yet this one I did not see coming. (ASRS #955213)

4. Preparation and Situational Awareness

Comfort Zone

Simplified preparation and shrinking SA – familiarity guides effort

Master Class Zone

Enhanced preparation and expanded SA – anticipate and manage workload

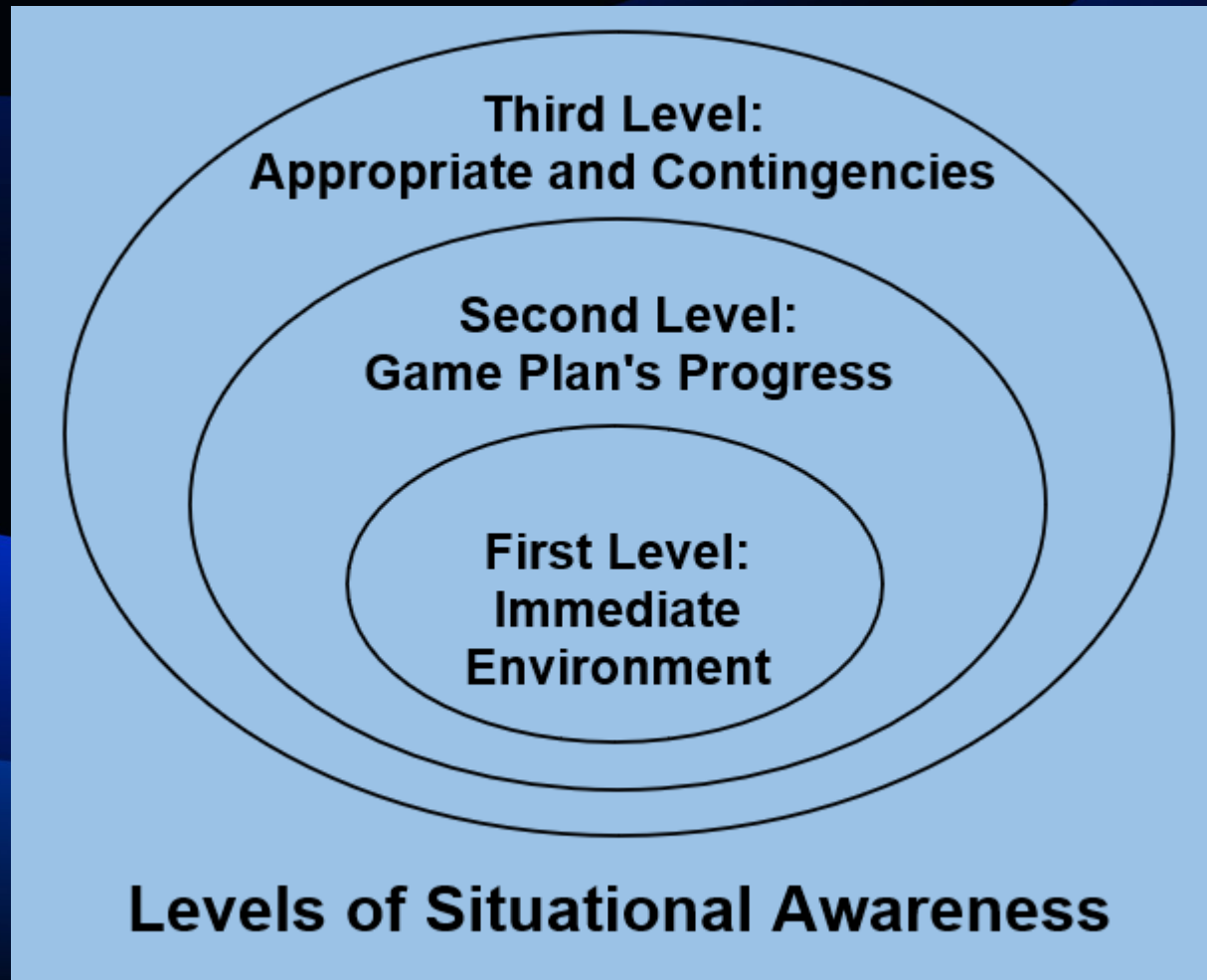
Comfortable pilot planning

- Select and force familiar game plans
- Simplified/Biased assessment of conditions
- Neglect to build contingency options
- Low anticipation for what could go wrong
- Rely on built-in safety margins

Crew Omega – ineffective contingency planning: Consider team Omega that doesn't update their SA or plan for contingencies. They review the flight planning products at the gate and conclude that they are unlikely to encounter significant weather. They rely on the dispatcher's assigned alternate. Approaching top of descent, they begin their standard arrival review process. They notice the deteriorating weather at the destination airport, but decide it must not be too bad since no one is diverting or being assigned holding. During descent, they see storm cells building near the airport. Quickly reviewing their options, they discover the line of thunderstorms that now blocks the route toward their assigned alternate. Too busy to contact their dispatcher, they press ahead.

The Captain comments that it is especially important for them to land since the assigned alternate is no longer viable. On final, they encounter moderate turbulence. They are startled when their windshear warning activates. While they are processing what to do, the windshear warning stops. They are still in moderate turbulence, but since they have the runway in sight, they continue. The turbulence continues to worsen as they cross the overrun. The FO calls for a go around, but the Captain overrides them and continues. In the flare, they experience a significant wind gust from the left and start drifting well right of centerline. The Captain dips the left wing to correct back to runway centerline and scrapes the left winglet.

Levels of Situational Awareness



Crew Alpha – effective contingency planning: Crew Alpha is an effectively communicating, high-SA team. They review their planning products for the expected conditions and select an appropriate game plan for the flight. They also discuss a number of possible contingency options. As the flight progresses, they monitor conditions for warning signs that may indicate that a contingency plan might be needed. They use SA-building options including contacting their dispatcher, calling ahead to the arrival station, and monitoring real-time weather through EFB apps. They notice a significant line of thunderstorms building between their scheduled destination and their assigned alternate.

Contacting their dispatcher, they coordinate a more favorable alternate that will remain unaffected by those thunderstorms. During their arrival, they discover significant weather conditions building at their destination. They continue to plan for both game plans – the original one for landing at the scheduled destination and a second one for possible diversion. On final, they encounter moderate turbulence. Their windshear warning activates for a moment, then stops. They anticipated this contingency, so they aren't surprised by it. Expanding their scan to the runway environment, they notice signs of microburst activity. They execute a go around and divert to their alternate.

“Briefing Better” process

1. The PM’s assessment of threats
2. The PF’s game plan to manage those threats
3. Open discussion of roles and counterfactuals that might threaten the plan and trigger backup options
4. The discussion continues until both pilots are satisfied with the shared mental model
5. A recap of the main points to highlight priorities

<https://www.aerosociety.com/news/briefing-better/>

5. Drift in everyday practice

Comfort Zone

Subconscious drift with procedural compliance – shortcutting and risky personal techniques

Master Class Zone

Conscious awareness of drift – emphasis on self-assessment, debriefs, and mindfulness

Drift exposes latent vulnerabilities

- Human nature to shortcut tasks that we perceive as redundant or unimportant
- We develop personal techniques – “feel” reward and lack of consequence
- Drift is sustained by normalization of deviance and rationalization

PROCEDURAL DRIFT RESULTS IN AIRCRAFT MOVEMENT AT THE GATE

Captain's report: ... aircraft moved forward after a nose chock was inserted. Both engines were shut down at the time of aircraft movement. Movement was immediately after shutdown of #2 engine. ... When I got home, I reread our shutdown procedures. I noticed that I did not follow the cautions of checking the accumulator pressure being in the green band. The truth be told, I have not been checking this for years. I have been checking for aircraft movement only after releasing the parking brake. A huge mistake that thankfully did not cause any injuries or damage. Most embarrassing for a seasoned Captain. I guess I need to go through all my normal procedures again highlighting all cautions and warnings. Surprising that in so many years of line checks and training events that this bad habit never caught up with me. (ASRS #1716069)

6. Applying an appropriate mindset

Comfort Zone

Irrational optimism – it always works out the in end

Master Class Zone

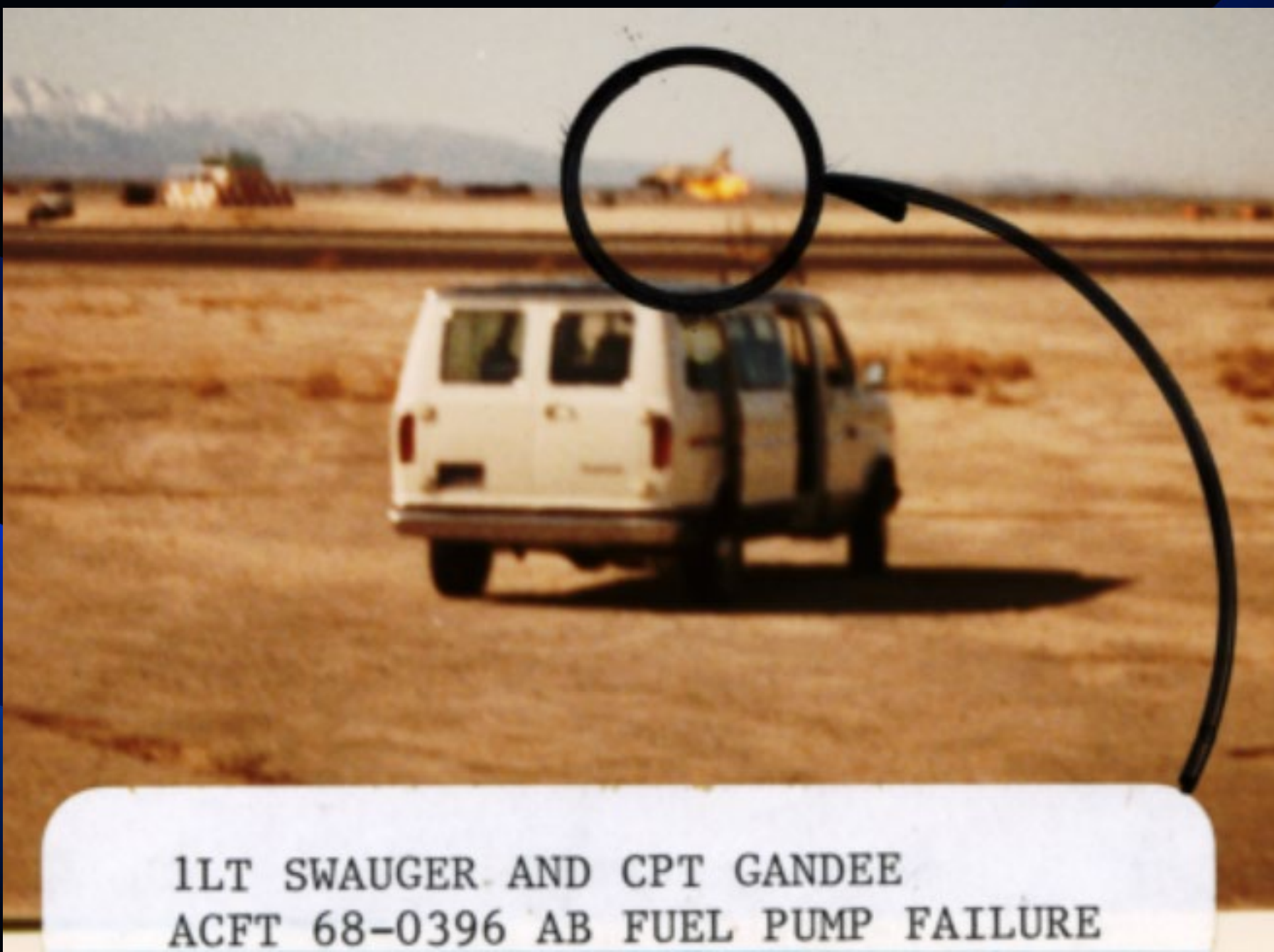
Proactive pessimism – proactive and purposeful vigilance

While on the RNAV approach to ZZZ Airport visibility deteriorated rapidly as the descent into the final approach segment of the RNAV XX. Heavy rain began prior to the arrival of the minimum approach altitude and continued until nearly reaching the field. Visibility deteriorated to the point of almost zero, yet the Captain continued the approach in belief the rain would clear up. At the missed approach altitude, I called “go missed” approximately 3 times in an effort to get the Captain to discontinue the approach, yet the Captain continued his descent into the field. As he continued, I continued to call negative contact, “GO MISSED”. The Captain ignored all calls and continued until breaking out at an altitude of nearly 200 ft. AGL, which was an extremely low altitude ... and well below the glide path.

The “break out” altitude was approximately 300 ft. below the appropriate ceiling requirements for the [approach]. Upon landing the Captain remarked “you were right, we should have went missed, I thought we were going to break out just below”. I have never been more afraid for my life I reported this incident to the training Captain. This is not the first time this has happened while flying with other Captains at Company X and the conduct has been reported to the director of operations and chief pilot multiple times and [I] was told to “not make waves”
(ASRS #2032767)

Master Class – proactive pessimism

- What are we missing?
 - Pre-mortem evaluation of the game plan
 - Specific role assignments to monitor for counterfactuals
- Mentally practice for adverse contingencies



1LT SWAUGER AND CPT GANDEE
ACFT 68-0396 AB FUEL PUMP FAILURE

7. Professional Growth

Comfort Zone

Less motivation, curiosity, or desire to grow professionally – flying is just a job

Master Class Zone

Motivated by curiosity and pursuit of wisdom – committed to life-long learning

Forming a Master Class intention

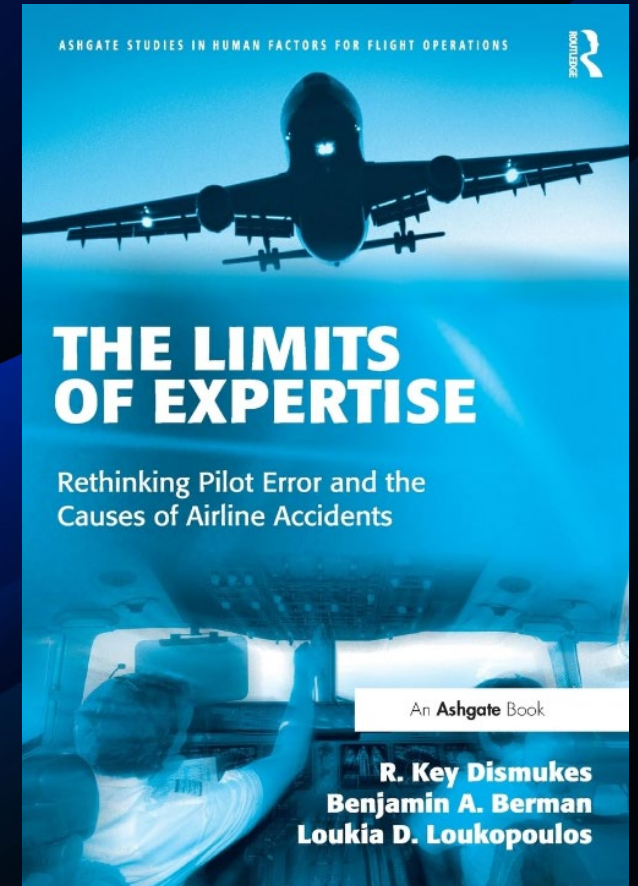
- Conscious decision to leave the comfort zone
 - Little growth in the comfort zone
 - Intention guides the direction and sustains the progress of growth

Purposeful practice

- 10,000' rule – Malcolm Gladwell – “Outliers”
 - K. Anders Ericsson and Robert Poole – “Peak”
 - Well-defined, specific goals
 - Focused attention
 - Preparation, briefing, execution, and feedback
 - Getting out of one's comfort zone

Purposeful practice in aviation

- Quality debriefs
 - Professional coaches
 - What makes a quality debrief?
 - Finding opportunities
 - Don McMonagle story
- Daily flying mindset versus adverse event mindset



Life-long learning – growth mindset

- Emphasis on depth, integration, and application of knowledge

Read on a daily basis.

Take courses.

Actively seek opportunities to grow.

Take care of your body.

Pursue diverse passions.

Value making progress.

Challenge yourself with specific goals.

Embrace change.

Believe that it's never too late to start something.

Share your attitude of getting better with others.

Leave your comfort zone.

Never settle down.

Oscar Nowik's lifehack.org website

Embrace pursuit of excellence

- “Amateurs practice until they get it right. Professionals practice until they can’t get it wrong.”
- Everyday excellence – reach toward perfection

Balanced priorities

Procedural compliance

Personal skills

Resilience

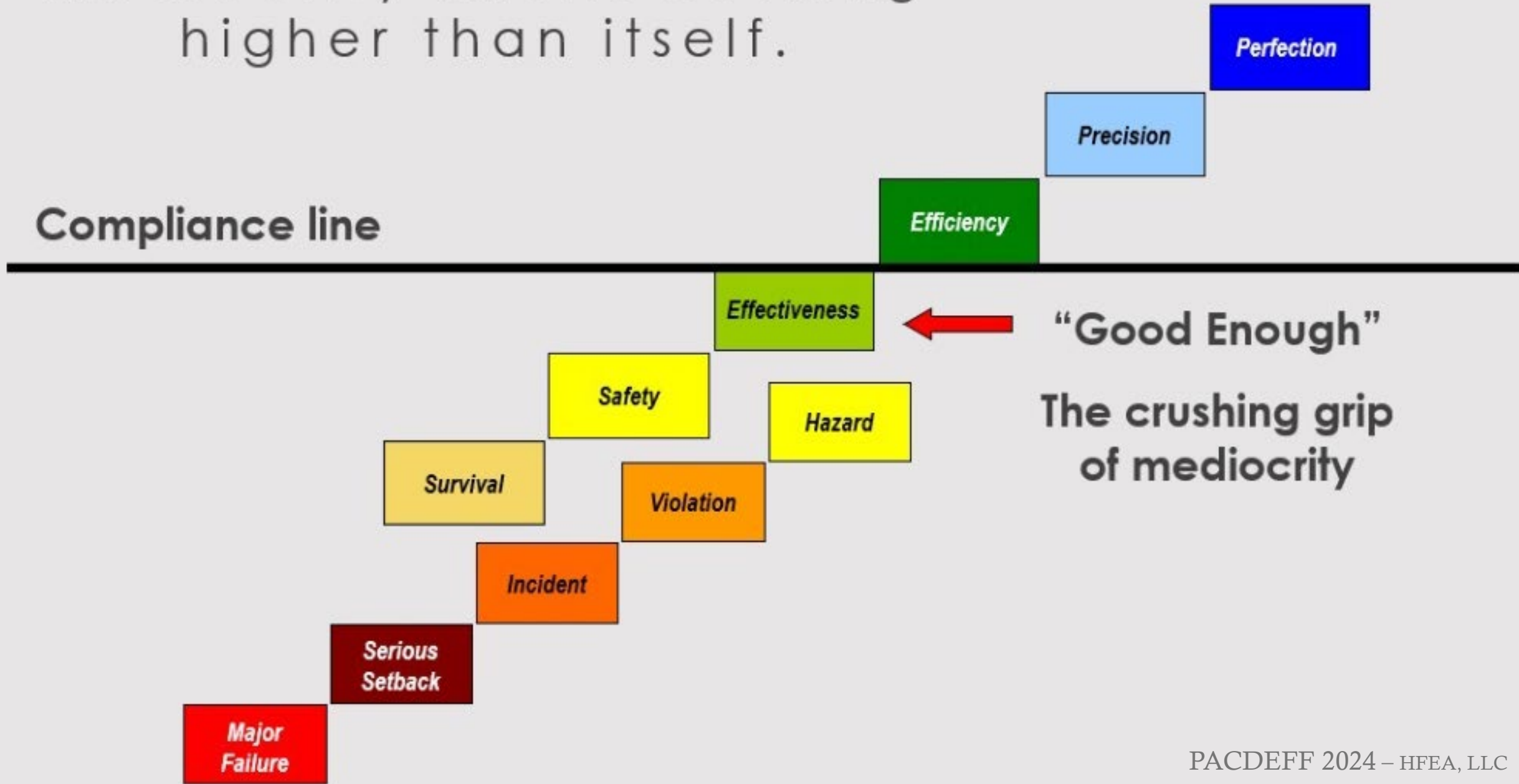
Positive mental attitude

Passion

Upward trajectory of wisdom

Effortlessness

Mediocrity knows nothing higher than itself.



Raising self-awareness

- Encourage meta-awareness
- Teach operators how to use their intuition
- Improve bias awareness
- Promote drift awareness

Organizational proactive professionalism

- Counter cynicism with curiosity and engagement
- Model, describe, and acknowledge professionalism
- Encourage active engagement with improving the work environment

MASTER CLASS CAPTAIN'S SAFETY RECOMMENDATION

Captain's report: ITO Runway 8 Visual Approaches, especially at night or marginal VFR conditions, constitutes increased risk and requires additional resources to mitigate this risk. The ITO airport information pages directs us to "at night, plan on arrivals to Runway 26", but tailwinds and wet runways often prevent this option. The airport information pages also directs us to "follow the shoreline south to Hilo Bay to intercept Runway 8 final". The issue is that the shoreline is only 1.5 NM west of the approach end of the extended centerline of Runway 8, which correlates to a maximum wings level altitude of 500' AGL upon rollout for a three degree glideslope. To even achieve this minimum, the approach requires "cheating" by offsetting further inland over downtown Hilo prior to the turn to final, to account for the turn radius which would be even greater with increased speeds associated with a flaps 15, single engine approach (such as an ETOPS single engine divert event), or accepting a steeper glideslope and rate of descent. Additive conditions such as the common inclement weather and winds and relatively sparse ambient lighting associated with Hilo, high terrain, (Company) Crews' relative unfamiliarity with the new ITO service, and the short inter-island flight times (which limit time to brief and prepare for a challenging approach) all add to the increased risk. Inter-island flying is often benign, but the ITO Runway 8 Visual is a challenging approach under the best of circumstances and could surprise unfamiliar ETOPS Aircrews without adequate awareness and preparation. I recommend the following steps be taken to mitigate the ITO Runway 8 Visual.

1. Expedite the creation of an RNAV visual to ITO Runway 8 to assist in situational awareness during the approach.
2. Make all ITO Runway 8 approaches Captain Only landings until the RNAV 8 Approach is created. The descending left-hand turn landing is even more challenging for the FO who has to look through the Captain's windows during the approach. The additional experience level of the Captain should help mitigate the risk.
3. Increase awareness through RBF's (Read Before Fly), notes on weather packets and Dispatch Releases describing the risks associated with the ITO Runway 8 Approach.
4. Encourage briefing of ITO Runway 8 Visual Approach procedures on the ground prior to departing for ITO when Runway 8 is in use, due to the short inter-island flight time.
5. Add a module to ETOPS recurrent training specifically addressing the ITO Runway 8 operations. (ASRS #1734822)

Master Airline Pilot

Applying Human Factors to
Reach Peak Performance and
Operational Resilience

Steve Swauger



If you want more information:

Available in all formats

- Academics can download a free review copy
- Available in paperback before the end of November

Masterairlinepilot.com

- Master pilot forum

Questions?