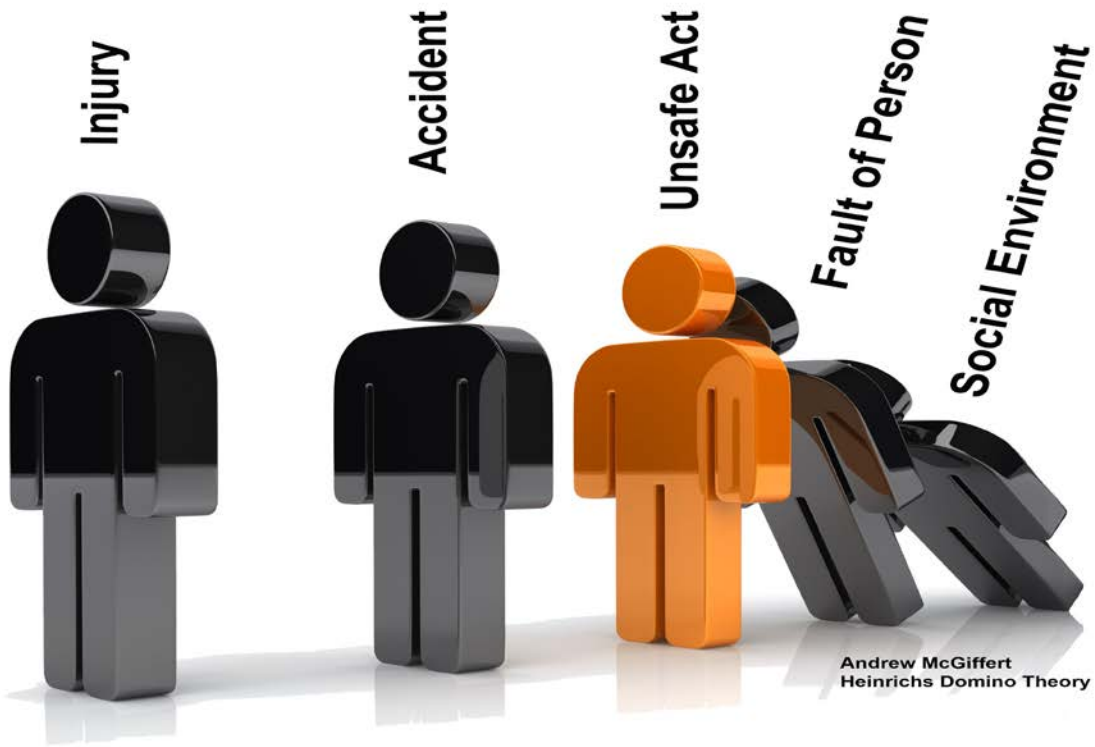
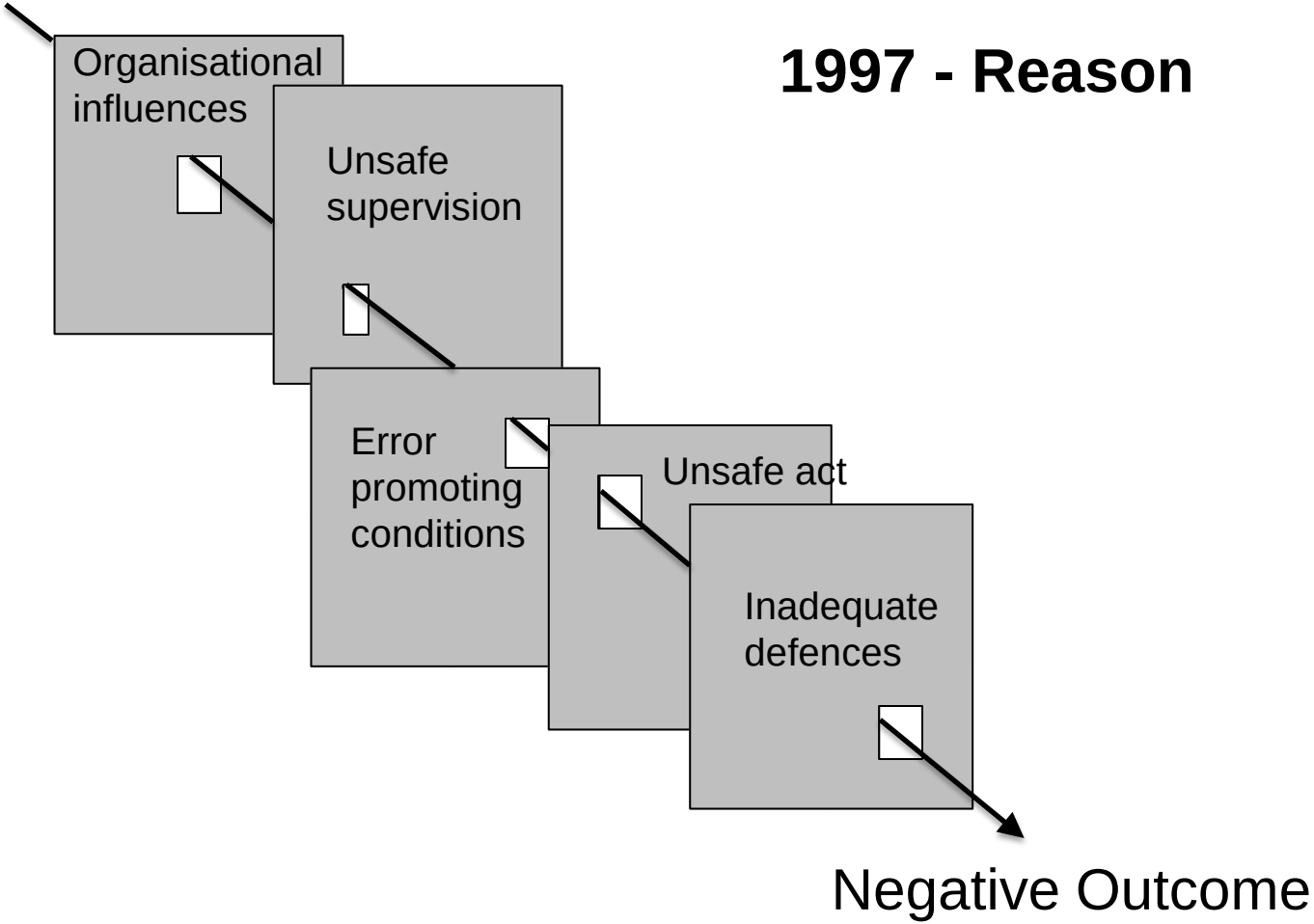
Engineering Resilient Safety Behaviour

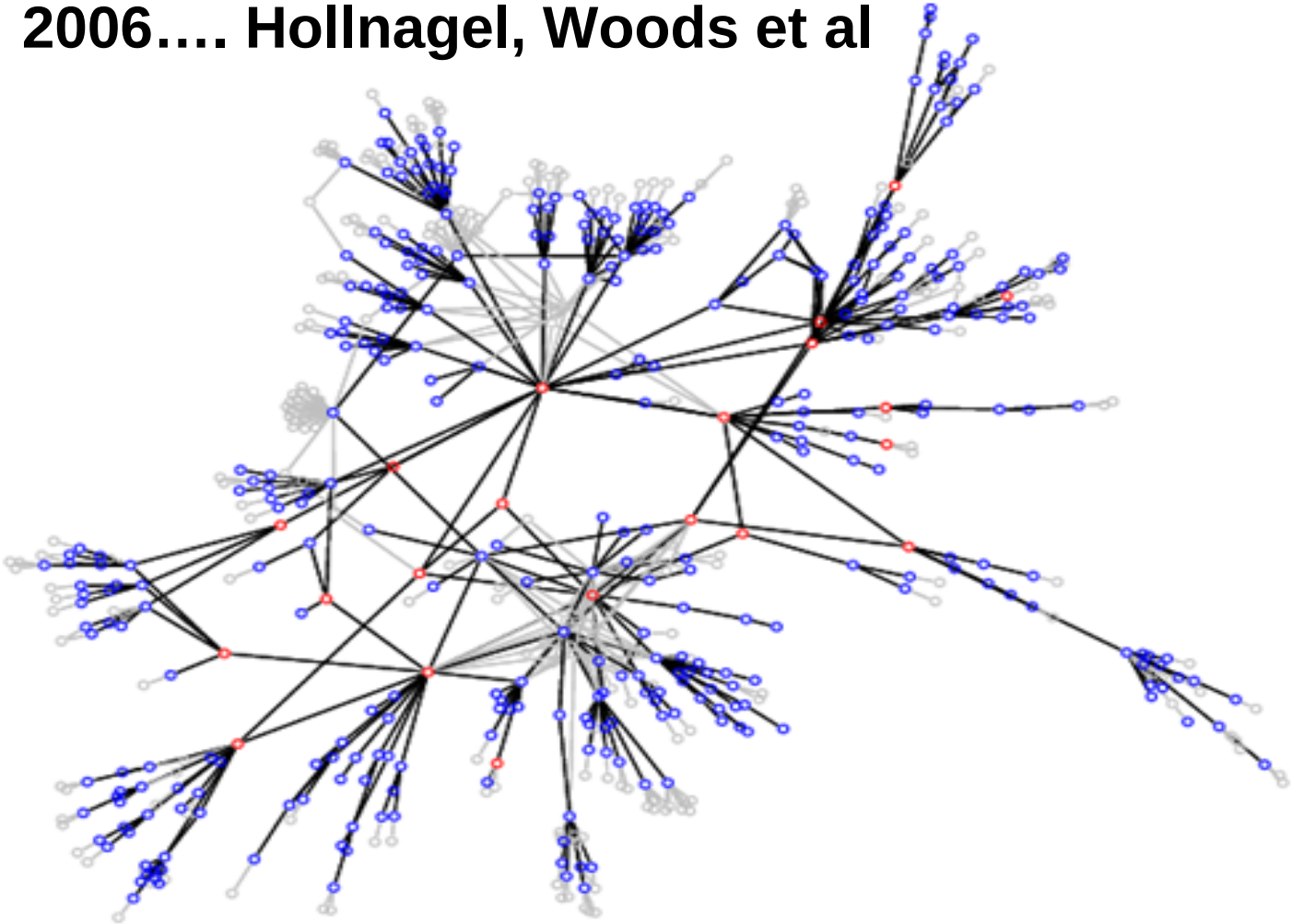


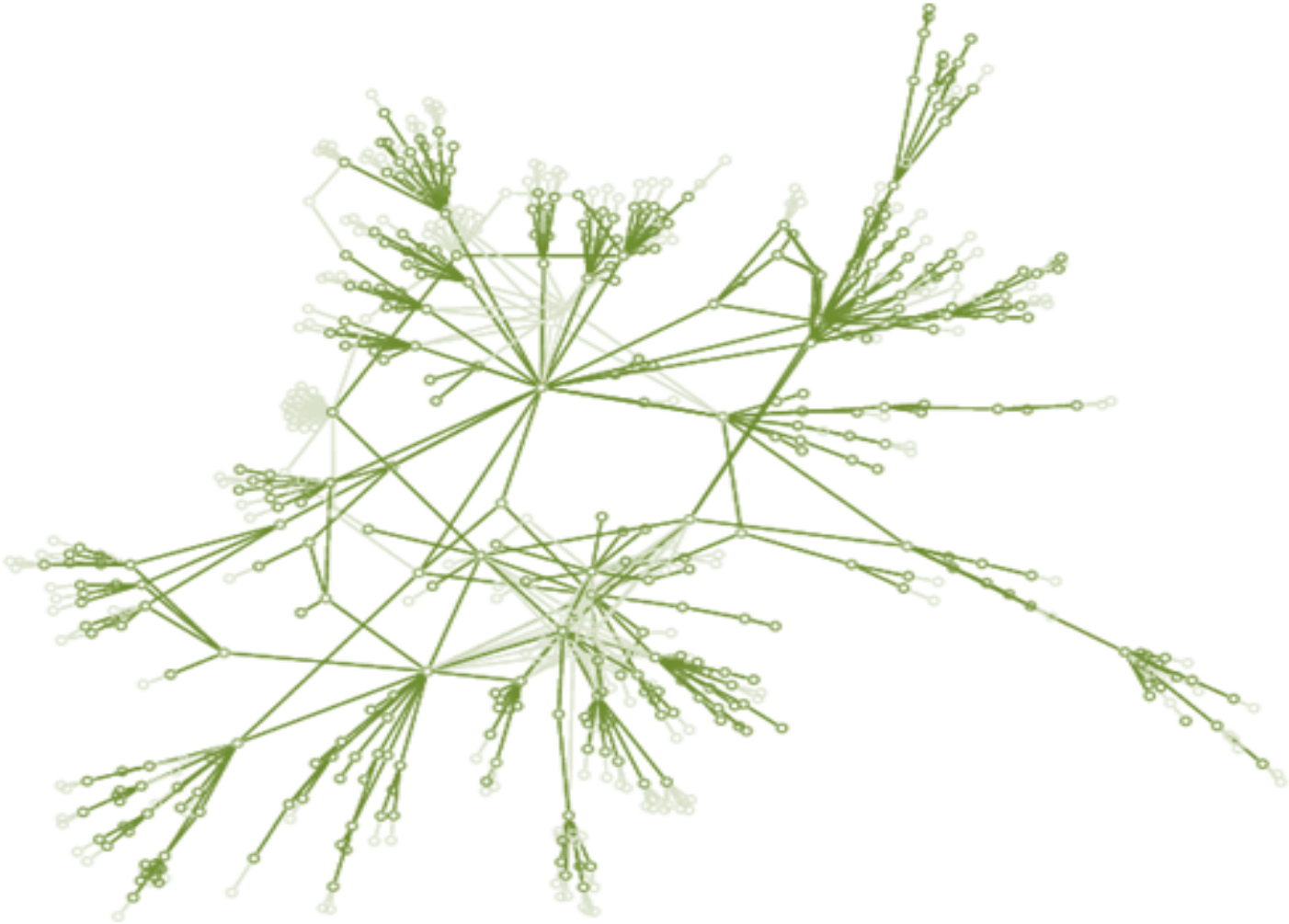
1931 - Heinrich

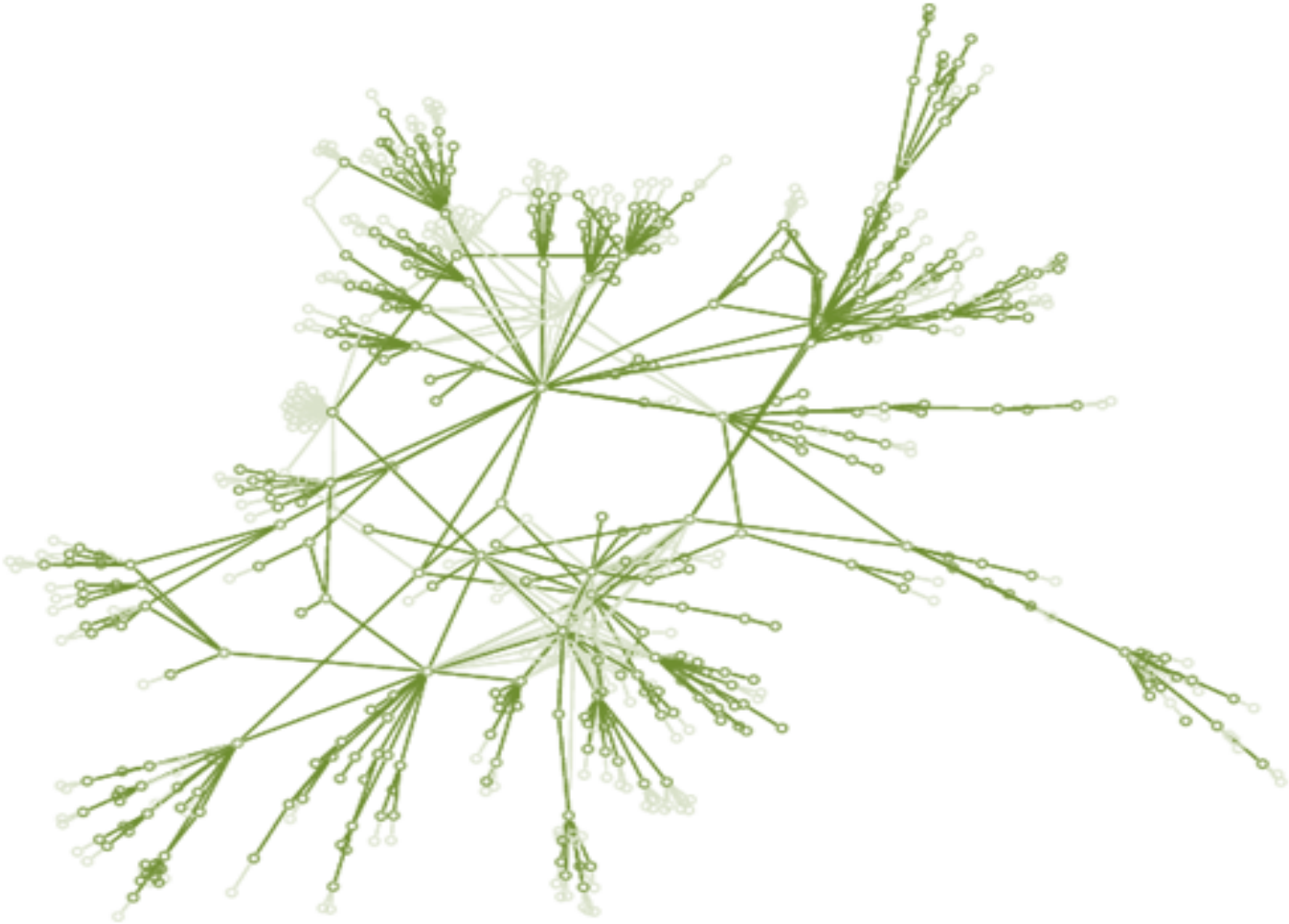
1997 - Reason


Organisational influences
Unsafe supervision
Error promoting conditions
Unsafe act
Inadequate defences
Negative Outcome

2006…. Hollnagel, Woods et al







“In the past, any time an employee provided a benefit for a customer that was considered unacceptable, the bankers and lawyers running Continental would write a rule documenting the proper action. Over the years, these rules were accumulated into a book about nine inches thick known as the Thou Shalt Not book. Employees couldn’t possibly know the entire contents of the book. When in doubt, everyone knew it was advised just to let the customers fend for themselves.”

“In early 1995, we took the Thou Shalt Not book to a company parking lot. We got a 55-gallon drum, tossed the book inside, and poured gasoline all over it. In front of a crowd of employees, we lit a match to it.

Our message was this: Continental is your company to make great. Go do it—now..”

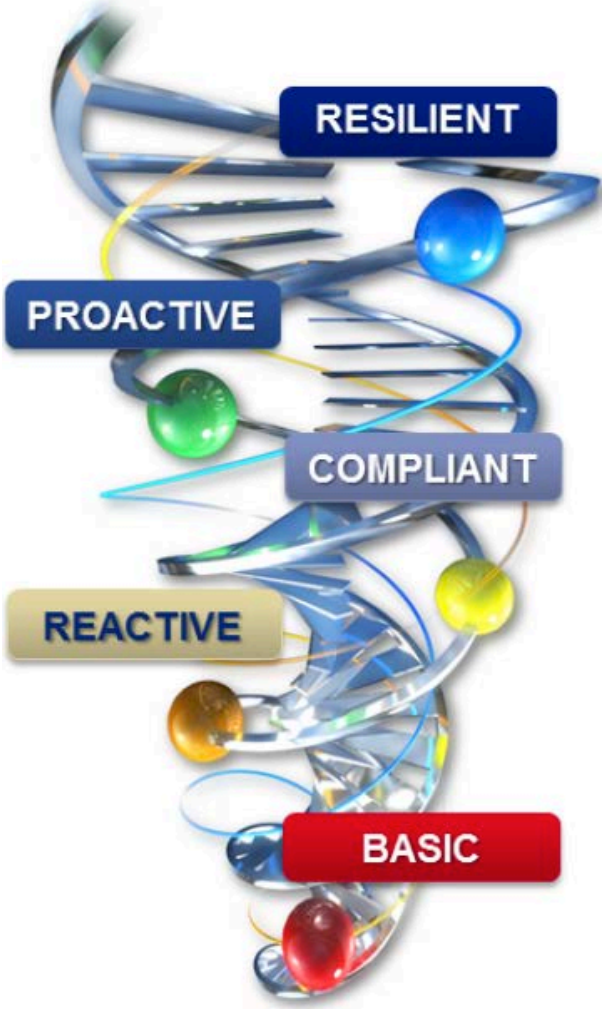
The more novel the solution, the more resilient it is

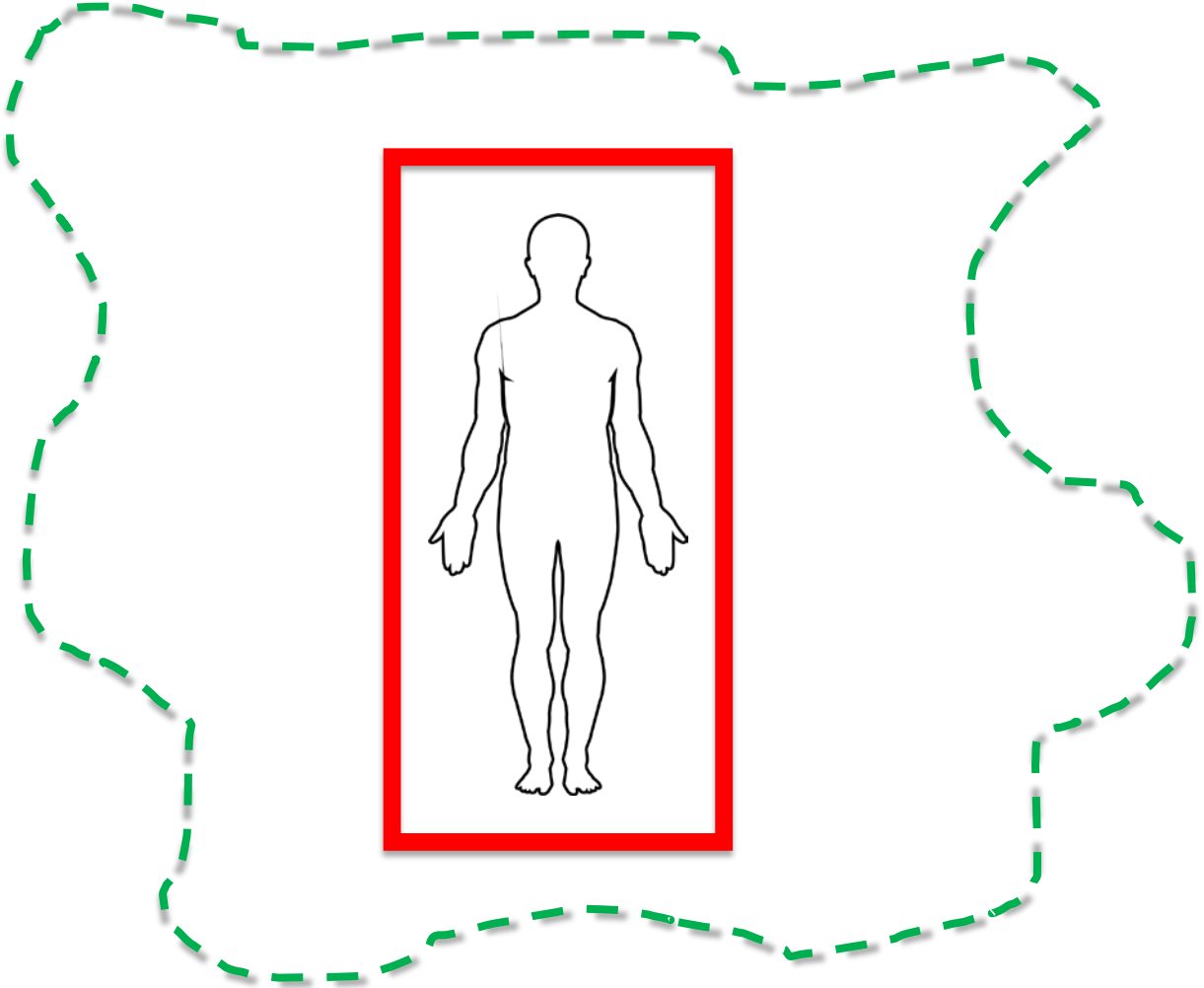
Resilience is the new catch-all term

It’s all just theory

Resilience is an alternative to SOPs

We can become resilient overnight


RESILIENT
PROACTIVE
COMPLIANT
REACTIVE
BASIC

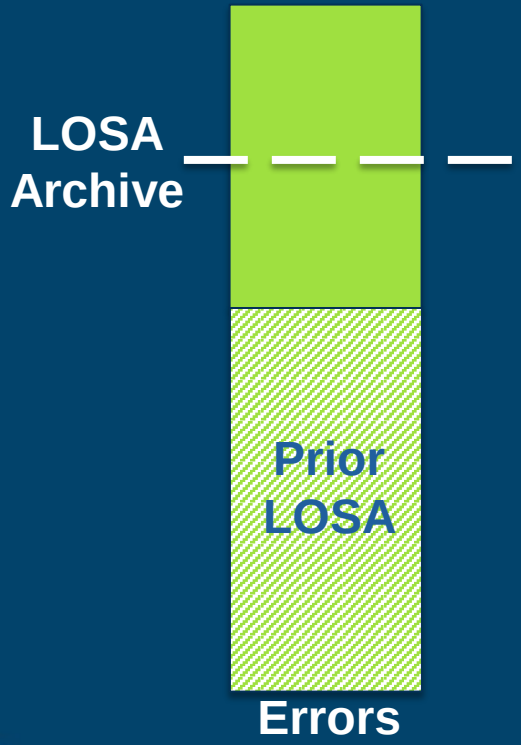


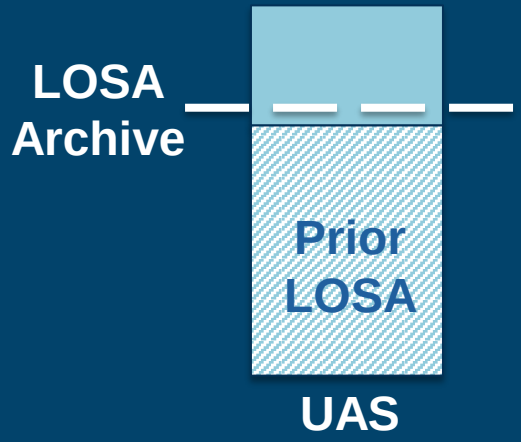

Rethinking the Briefing

Primary Drivers for Change…

- Internal Data
- Pilot Feedback
- Best Practices
- Industry Accidents
- Human Factors

LOSA Data - Briefings





FOQA

Q. What do you think of our briefings?

Relevance is lacking

Too long!

Items continually being added

Equal attention shouldn’t be given to all items


Worldwide Services
Synchronizing the world

NATIONAL TRANSPORTATION SAFETY BOARD
Office of Aviation Safety
Washington, D.C. 20594
DCA13MA133

04:23:45.7
HOT-1 ahhh. verify VNAV path on approach chart. ah it is.

04:23:56.6
HOT-1 ILS glideslope out approaches.

04:24:00.5
HOT-1 VNAV path is the same as the ILS glideslope.

04:24:11.2
HOT-1
alright and uh. determine DA or D-DA and set altimeter bugs. and there is a note there only-only authorized operators may use VNAV DA in lieu of uhm MDA. alright so it will be twelve hundred for us. and uhhh.

04:24:19.4
HOT-2 mmm hmm.

04:24:25.9
HOT-2 twelve hundred huh.

04:24:34.3
HOT-1 okay. and in case uh a barometric DA may be utilized on the following approaches. ILS glideslope out. or approaches titled ILS or localizer runway. which is this case. or ILS or localizer DME runway bla bla bla.

04:24:52.8
HOT-1 all approaches with VNAV ball note. ball note states only authorized operators may use VNAV DA in lieu of MDA.

04:25:00.8
HOT-1 alright. this is US airspace. load approach in FMC database. enter DA. or D-DA on approach page.

04:25:17.2
HOT-1 okay and uh. verify database vertical path angle agrees with approach chart within one degree.

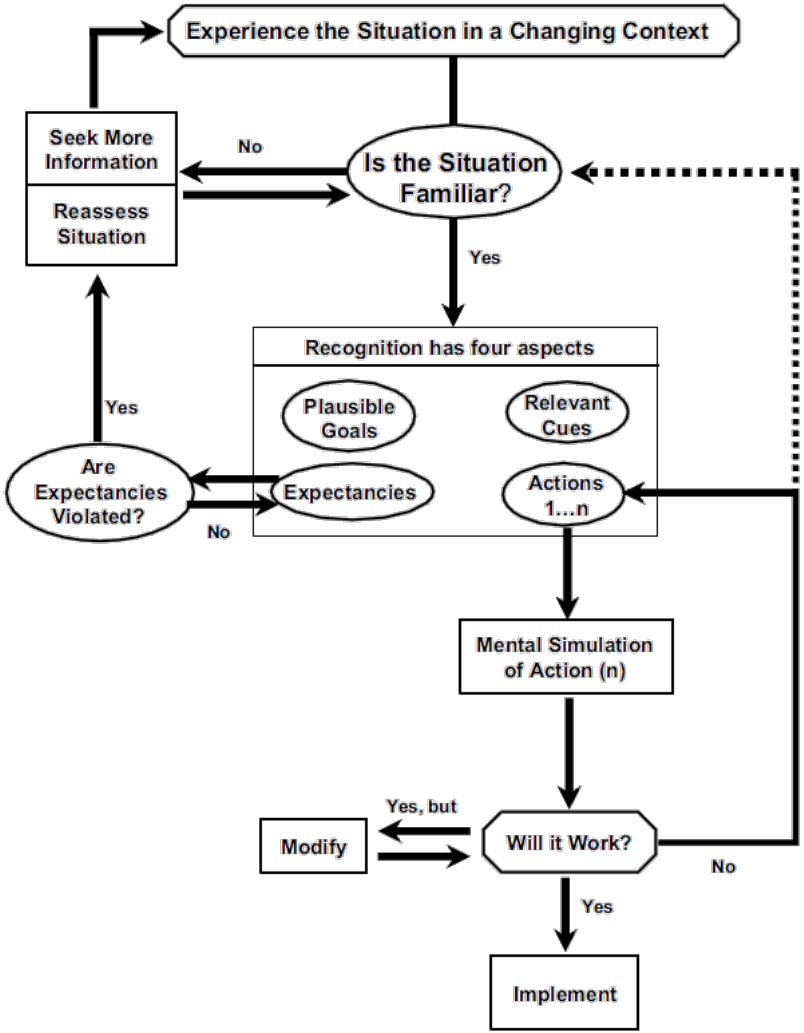
04:25:29.9
HOT-2 [mumbling] ** verify * approach to * point one degrees.

04:25:30.8
HOT-1 okay.

04:25:35.3
HOT-1 and.

04:25:37.8

RPD Model



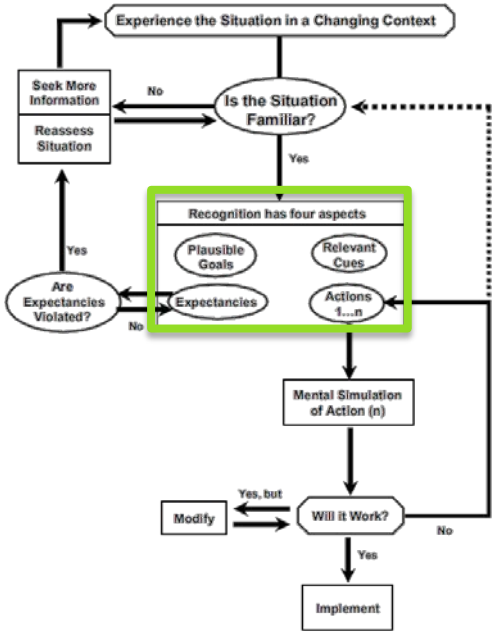
How experts make decisions

Klein/Orasanu/Calderwood/Zsambok

Rethinking the Briefing

Brief like you are building a story,

establishing goals, relevant cues and expectations…



The List… c.1992

DEPARTURE BRIEF

After the Instrument Crosscheck and prior to the Before Start Checklist, the PF will give a Departure Brief consisting of:

- Clearance
- Probable taxi directions to departure runway if any “Hot Spots”, unique or complex intersections or routes are anticipated
- Departure Runway/SID/Procedures – For all LNAV departures comply with FMC Navigation Verification (see General Procedures)
- Departure Setup
- Engine Failure/Turn Procedure: return for landing considerations

The List… c.2002

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- Departure Setup
- Engine Failure/Turn Procedure: return for landing considerations
- Takeoff Data Verification

  Validity of the Takeoff Performance Report (TPR) or ACARS Takeoff Data
  - Aircraft number
  - Airport
  - OAT – from Planned OAT (POAT) to POAT -5, inclusive
  - Altimeter – no decrease if below 29.70
  - Winds – min headwind or max tailwind not exceeded, no unplanned tailwind
  - Expected TOW – at or below Planned Takeoff Weight (PTOW)
  - Runway conditions – not worse than planned

  Brief any planned deviations from the Standard Takeoff Configuration.
  - The Standard Takeoff Configuration defined as:
  - Flaps 5
  - Normal Speeds (e.g. no improved climb or windshear additives)
  - Bleeds on
  - Anti-ice off
  - Dry runway
  - No runway modifier
  - No Minimum Headwind
  - No Tailwind

The List… c.2012

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  - Bleeds on
  - Anti-ice off
  - Dry runway
  - No runway modifier
  - No Minimum Headwind
  - No Tailwind
- Any weather considerations

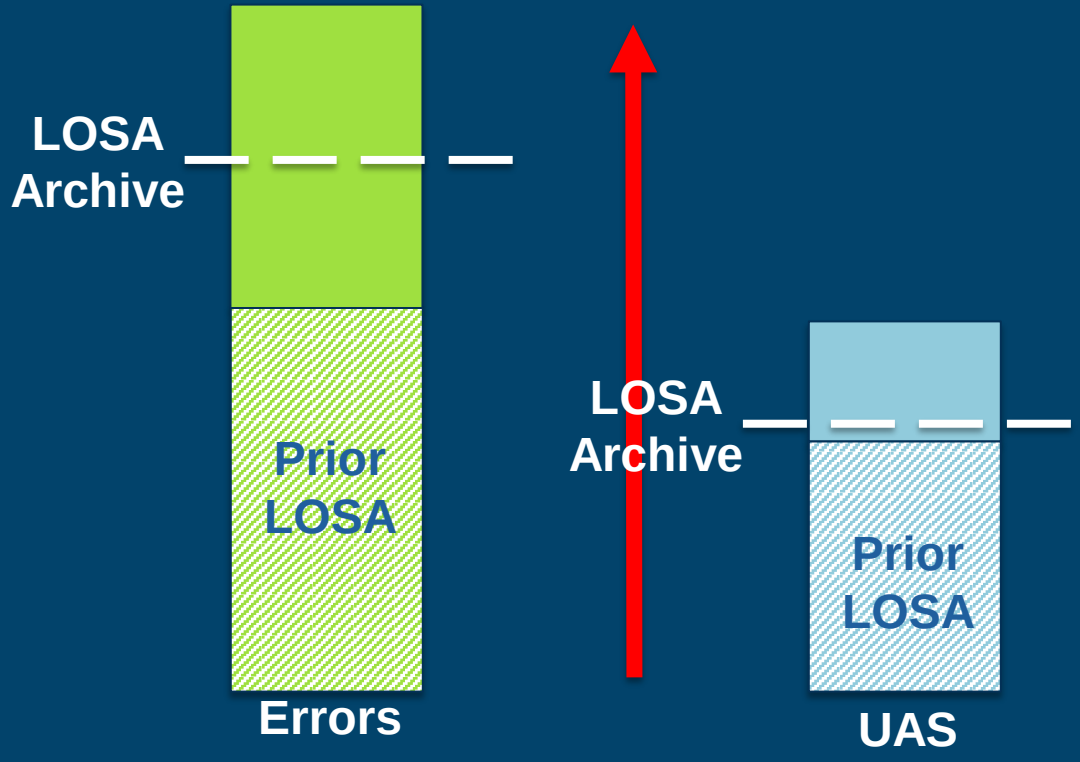
  Windshear, low visibility, takeoff alternate, runway condition, deice, anti-ice, etc.
- Any terrain considerations
- Any CRM, ATC, or TCAS considerations
- Verify TAKEOFF REF entries (runway, flaps, thrust, assumed temp, V-speeds).
- Maintenance status of the aircraft

  -MELs and their implications

  -Airworthiness Status to include status of any maintenance in progress

Will!

LOSA Data - Briefings



The List… c.2012

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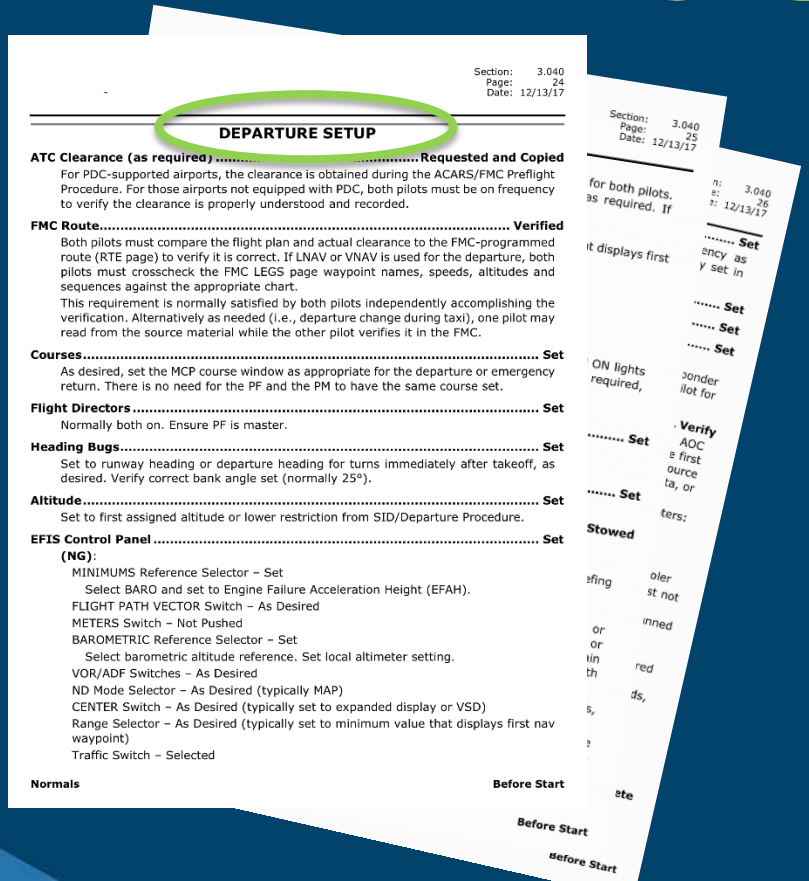
The Set-up



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Page: 24
Date: 12/13/17

DEPARTURE SETUP

ATC Clearance (as required) ..... **Requested and Copied**
For PDC-supported airports, the clearance is obtained during the ACARS/FMC Preflight Procedure. For those airports not equipped with PDC, both pilots must be on frequency to verify the clearance is properly understood and recorded.

FMC Route ..... **Verified**
Both pilots must compare the flight plan and actual clearance to the FMC-programmed route (RTE page) to verify it is correct. If LNAV or VNAV is used for the departure, both pilots must crosscheck the FMC LEGS page waypoint names, speeds, altitudes and sequences against the appropriate chart.
This requirement is normally satisfied by both pilots independently accomplishing the verification. Alternatively as needed (i.e., departure change during taxi), one pilot may read from the source material while the other pilot verifies it in the FMC.

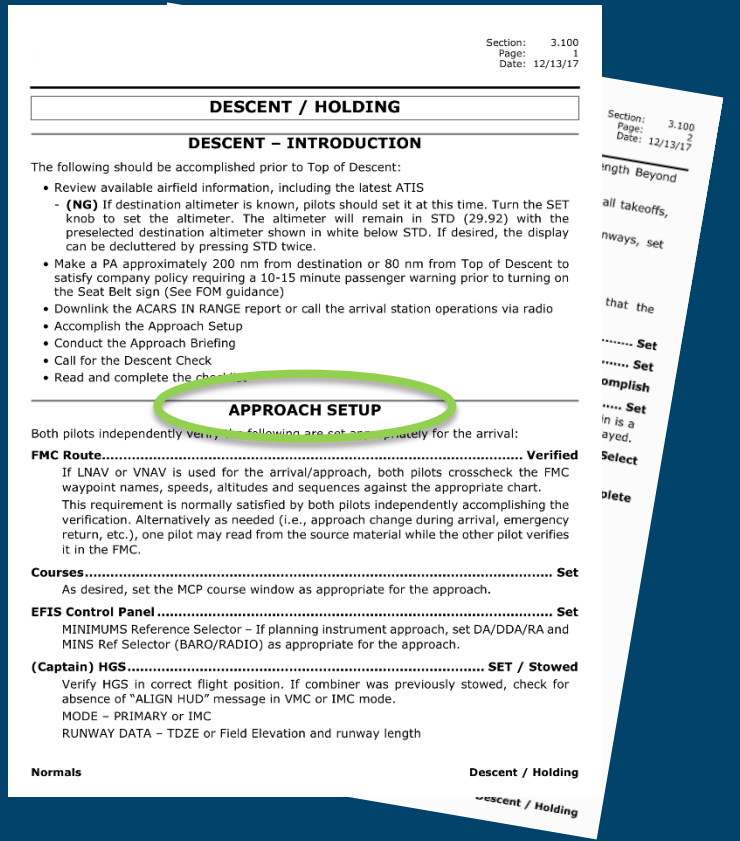
Courses ..... **Set**
As desired, set the MCP course window as appropriate for the departure or emergency return. There is no need for the PF and the PM to have the same course set.

Flight Directors ..... **Set**
Normally both on. Ensure PF is master.

Heading Bugs ..... **Set**
Set to runway heading or departure heading for turns immediately after takeoff, as desired. Verify correct bank angle set (normally 25°).

Altitude ..... **Set**
Set to first assigned altitude or lower restriction from SID/Departure Procedure.

EFIS Control Panel ..... **Set**
(NG):
MINIMUMS Reference Selector – Set
Select BARO and set to Engine Failure Acceleration Height (EFAH).
FLIGHT PATH VECTOR Switch – As Desired
METERS Switch – Not Pushed
BAROMETRIC Reference Selector – Set
Select barometric altitude reference. Set local altimeter setting.
VOR/ADF Switches – As Desired
ND Mode Selector – As Desired (typically MAP)
CENTER Switch – As Desired (typically set to expanded display or VSD)
Range Selector – As Desired (typically set to minimum value that displays first nav waypoint)
Traffic Switch – Selected



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DESCENT / HOLDING

DESCENT – INTRODUCTION

The following should be accomplished prior to Top of Descent:

- Review available airfield information, including the latest ATIS
  - **(NG)** If destination altimeter is known, pilots should set it at this time. Turn the SET knob to set the altimeter. The altimeter will remain in STD (29.92) with the preselected destination altimeter shown in white below STD. If desired, the display can be decluttered by pressing STD twice.
- Make a PA approximately 200 nm from destination or 80 nm from Top of Descent to satisfy company policy requiring a 10-15 minute passenger warning prior to turning on the Seat Belt sign (See FOM guidance)
- Downlink the ACARS IN RANGE report or call the arrival station operations via radio
- Accomplish the Approach Setup
- Conduct the Approach Briefing
- Call for the Descent Check
- Read and complete the check

APPROACH SETUP

Both pilots independently verify the following are set appropriately for the arrival:

FMC Route ..... **Verified**
If LNAV or VNAV is used for the arrival/approach, both pilots crosscheck the FMC waypoint names, speeds, altitudes and sequences against the appropriate chart.
This requirement is normally satisfied by both pilots independently accomplishing the verification. Alternatively as needed (i.e., approach change during arrival, emergency return, etc.), one pilot may read from the source material while the other pilot verifies it in the FMC.

Courses ..... **Set**
As desired, set the MCP course window as appropriate for the approach.

EFIS Control Panel ..... **Set**
MINIMUMS Reference Selector – If planning instrument approach, set DA/DDA/RA and MINS Ref Selector (BARO/RADIO) as appropriate for the approach.

(Captain) HGS ..... **SET / Stowed**
Verify HGS in correct flight position. If combiner was previously stowed, check for absence of "ALIGN HUD" message in VMC or IMC mode.
MODE – PRIMARY or IMC
RUNWAY DATA – TDZE or Field Elevation and runway length

New QRC

▲ DEPARTURE BRIEFING

Threats (PM, PF)

Plan

- Taxi, Dept Rwy
- Route (Clearance/Flight Plan – FMC RTE crosscheck)
- Return (emerg, T/O alt)
- T/O perf valid, perf/config issues

Considerations

- Any specific PM duties, other considerations
- Recap as needed

New QRC

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▲ APPROACH BRIEFING

Threats (PM, PF)

Plan
- Route (STAR, Approach, Approach Mode, M/A, Alt fuel-route)
- Lnd Rwy, Assessment, LTP, Exit, Taxi
- Autobrakes
- Flaps, VREF, Target Speed

Considerations
- Any specific PM duties, other considerations
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New QRC

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- Autobrakes
- Flaps, VREF, Target Speed

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DEBRIEF

To improve performance:

1. How do you think that went?
   Note: Debrief both excellent performance and areas to improve.
2. If we could do it again, what would we do differently?
3. Are there any reports to complete/submit?

WHAT ARE OUR THREATS?

Airport/Runway
- Contamination
- Construction
- Hotspots

Adverse WX
- Visibility
- Deicing
- Winds
- Precipitation

Environment
- Terrain
- Night
- Traffic

ATC
- Clnc/Re-Routes
- Arr/Dep amendts
- R/W Changes

Airline/Ops/ Dispatch
- Sched Pressure
- Delays
- Paperwork

Physiology
- Fatigue onset
- Stress
- Hydration
- Nutrition

Aircraft
- Systems
- MELs
- Automation
- Performance

Ground/Ramp/ MX
- Handling
- Congestion
- Logbook

Cabin
- Passengers
- Interruptions

T

P

C

▲ DEPARTURE BRIEFING

Threats (PM, PF)

Plan

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- Route (Clearance/Flight Plan – FMC RTE crosscheck)
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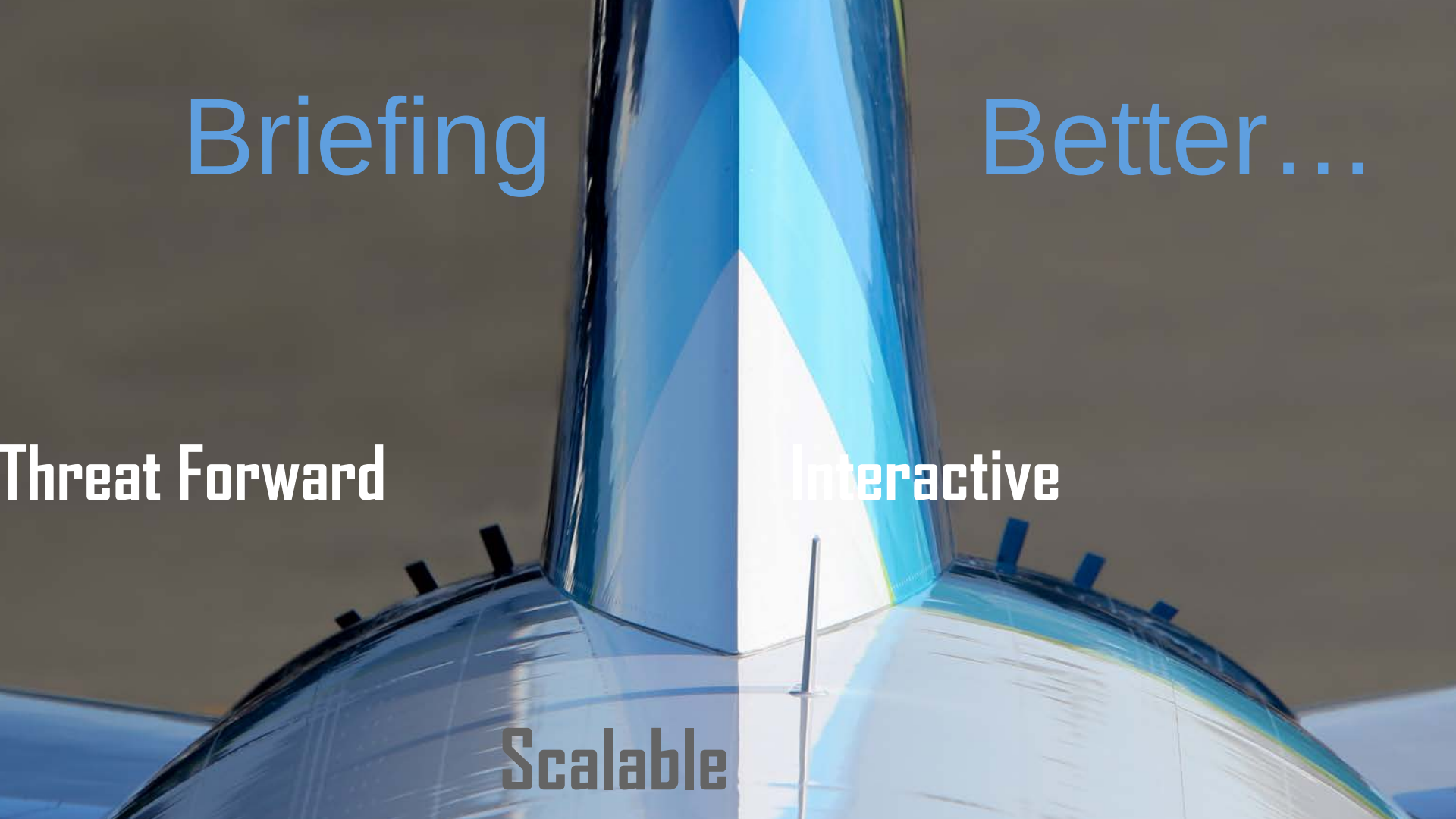
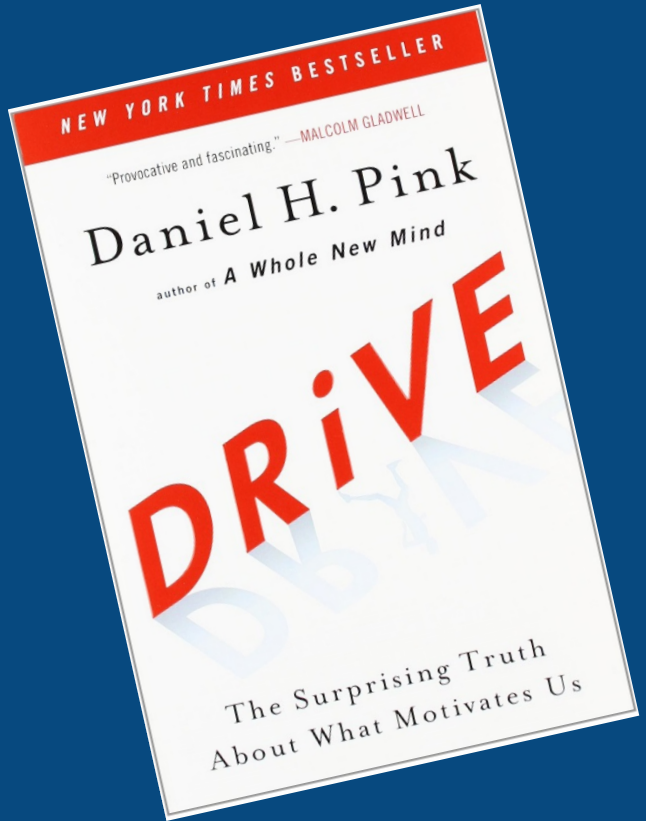
My leg, your leg…

OUR LEG


Briefing
Better…
Threat Forward
Interactive
Scalable

“Carrots and sticks are so last century. For 21st Century work we need to upgrade to AUTONOMY, MASTERY AND PURPOSE.”



Captain Rich Loudon
richard.loudon@alaskaair.com

Captain David Moriarty
d.j.moriarty@hotmail.com

Thank you!