INITIAL MEASURES SHOW WEB-DELIVERED LEARNING MODULE IMPROVES PILOTS' **MONITORING & ANTICIPATION**






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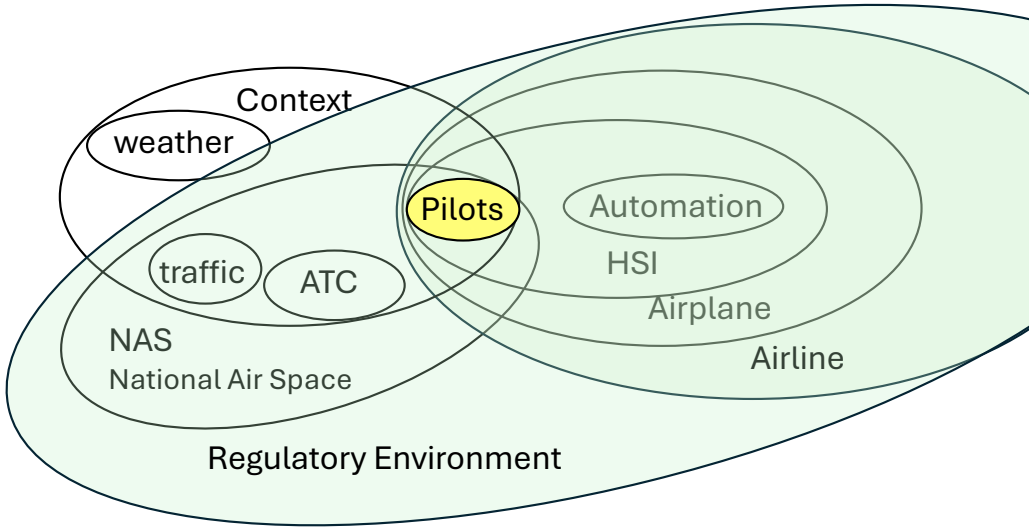
INITIAL MEASURES SHOW
WEB-DELIVERED LEARNING MODULE
IMPROVES PILOTS'
MONITORING & ANTICIPATION

1) Monitoring and Anticipation
2) The Learning Module
3) Evaluation
4) Big Picture

Monitoring & Anticipation

- Importance.
- Inadequate monitoring as contributor to accidents.
- Need for improving training & measurement

A side tour to reflect on complexity



Monitoring in complexity

- Big variation across contexts, many unfamiliar situations
- Reliance on preloaded solutions OR think it out?
- A middle ground?

Monitoring & Anticipation

- Importance.
- Inadequate monitoring as contributor to accidents.
- Need for improving training & measurement

NTSB

- ❖What are pilots' contributions to safety?
- ❖How can those contributions be measured?
- ❖What skills and knowledge should be included in training?

What is Monitoring?

not just

Where you point your eyes

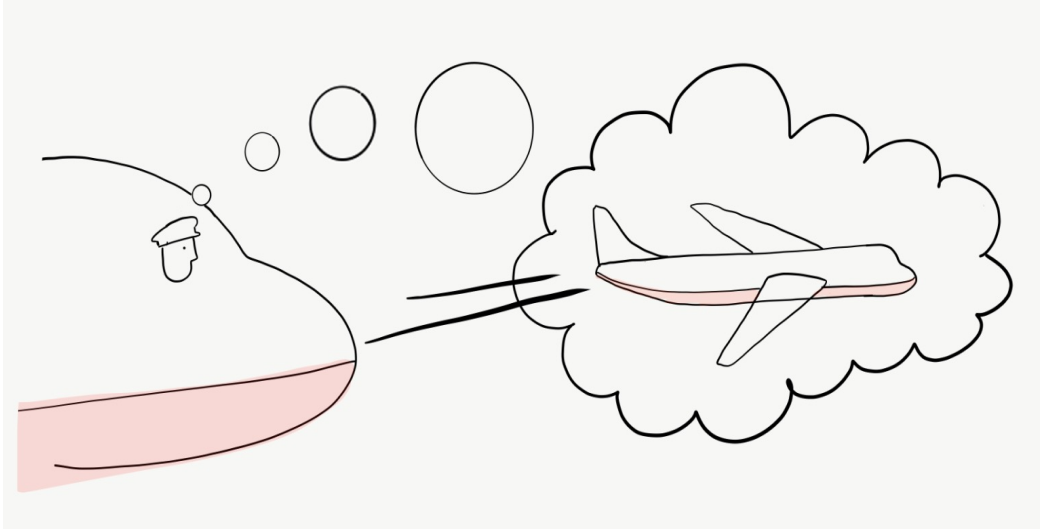
Being “vigilant”

Tracing a scan pattern

Our view of monitoring

Monitoring is *making sense* of the situation

"Flying ahead
of the plane."



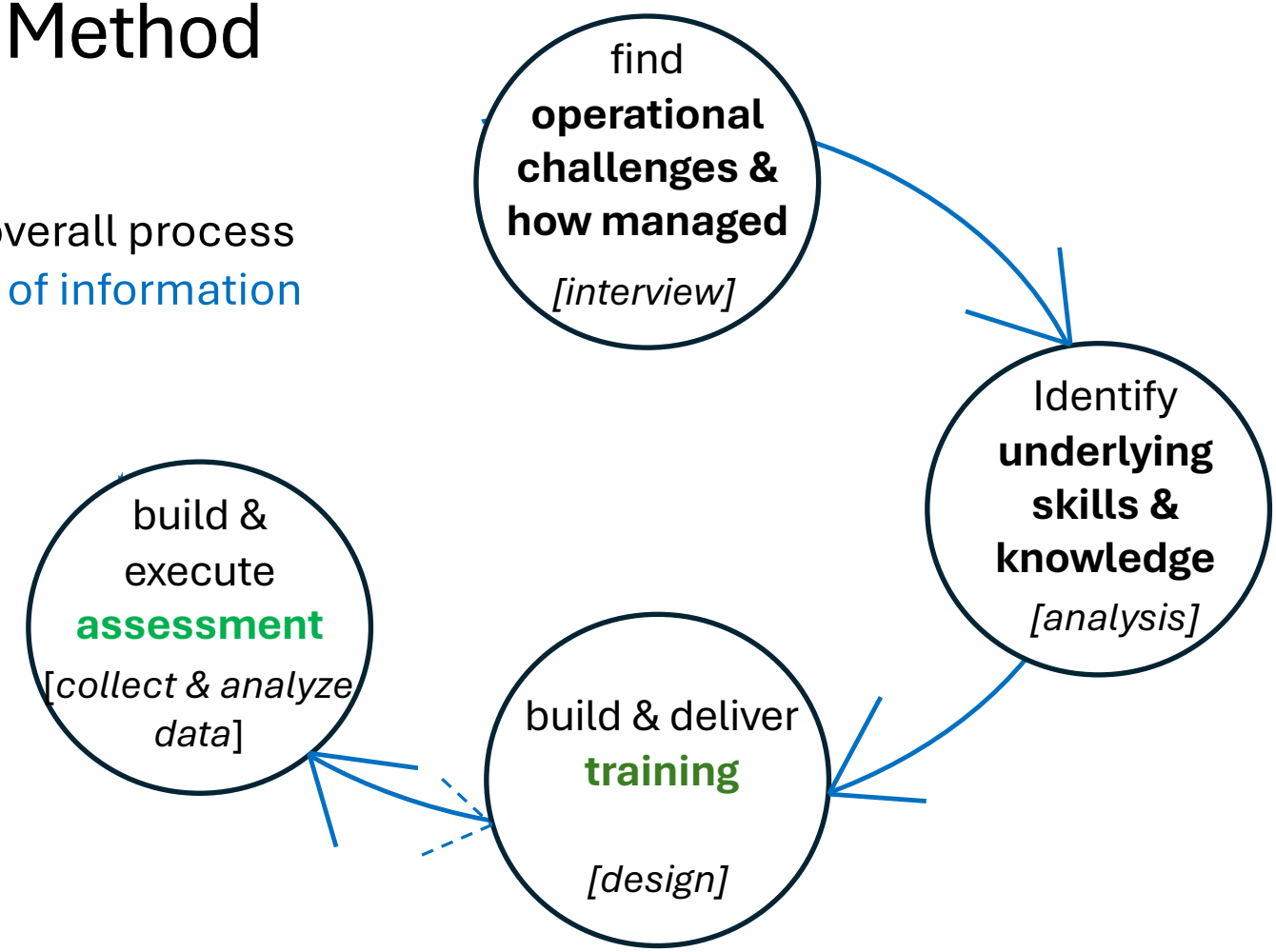
Monitoring and anticipation interlock.
They are informed by and guide a *situation model*.

The Project's Method

A quick tour of our overall process

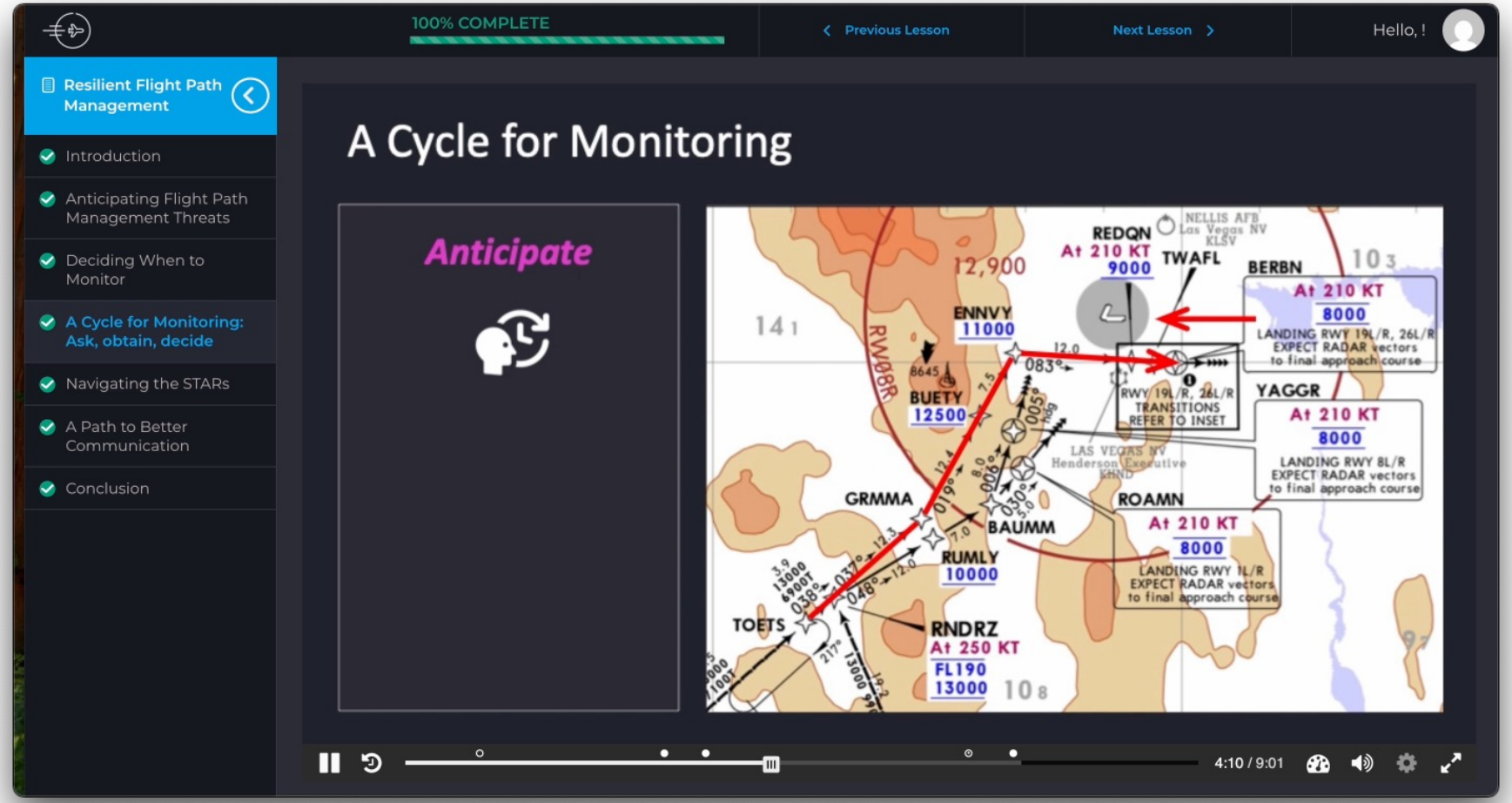
→ The flow of information

Focus on Flight Path in Descent



The Learning Module

The Learning Module



Training Approach: Content, Principles, Delivery

Content

3 Components

- proactive thinking,
- context-relevant strategies,
- communication

In Context

- descent flight path
- energy management

Learning Design Principles

- Relate to learner's experience
- Integrate w prior knowledge
- Engage
- Reduce cognitive load
- …

Interactive Web Delivery

- Pilot & airline cost & convenience (if effective)

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- ❖ communication

In Context

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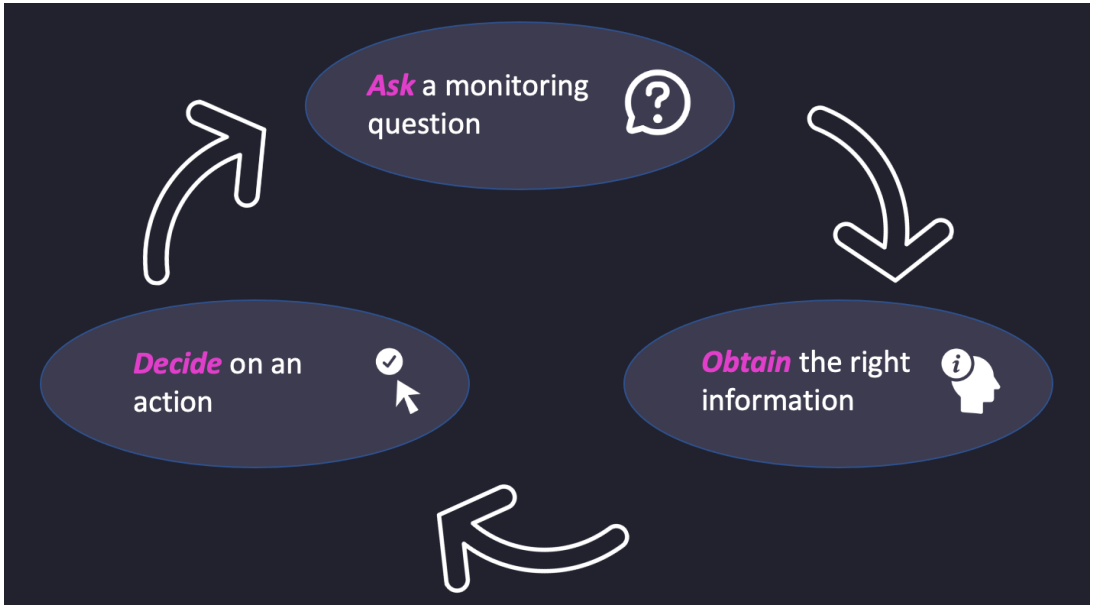

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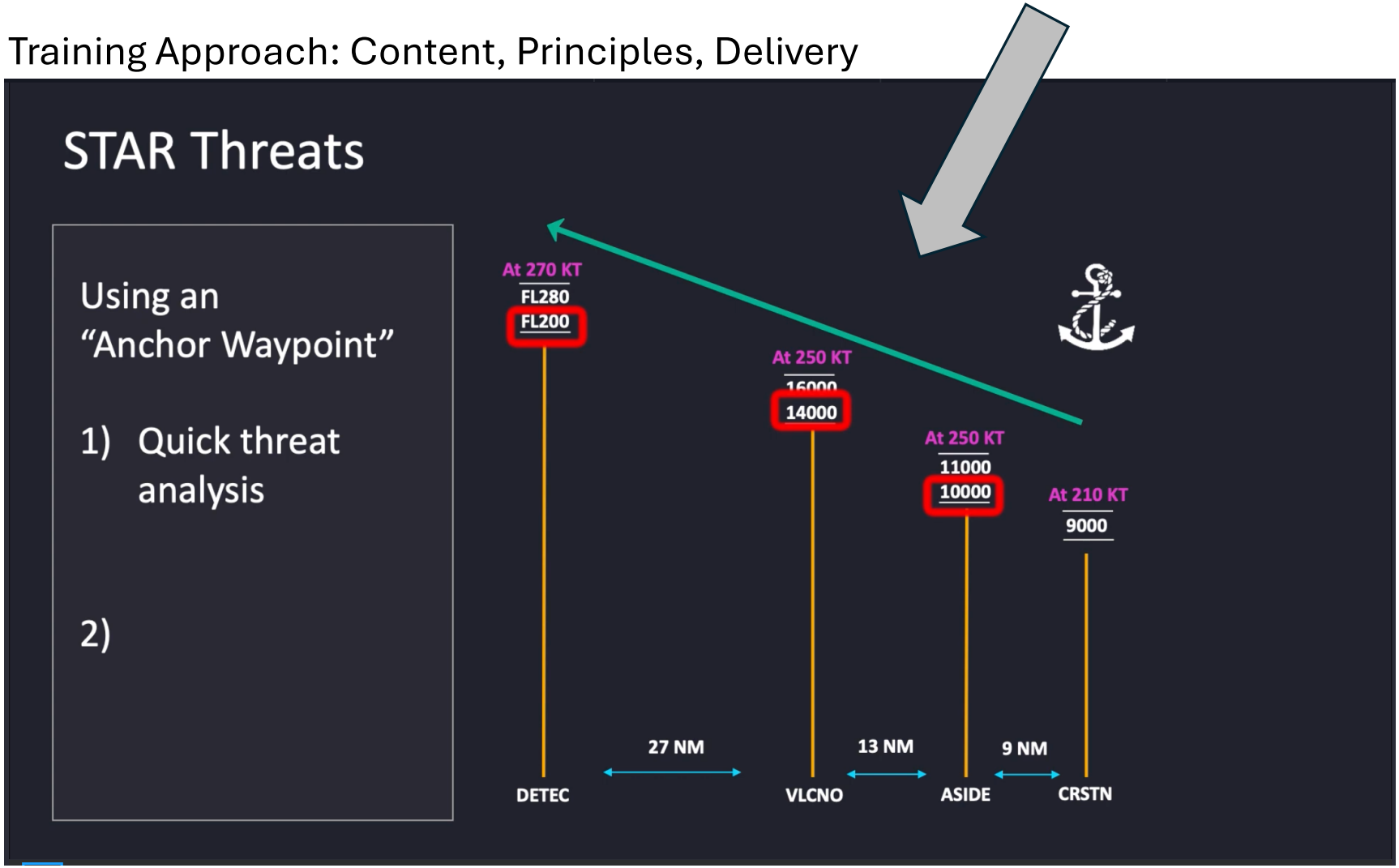

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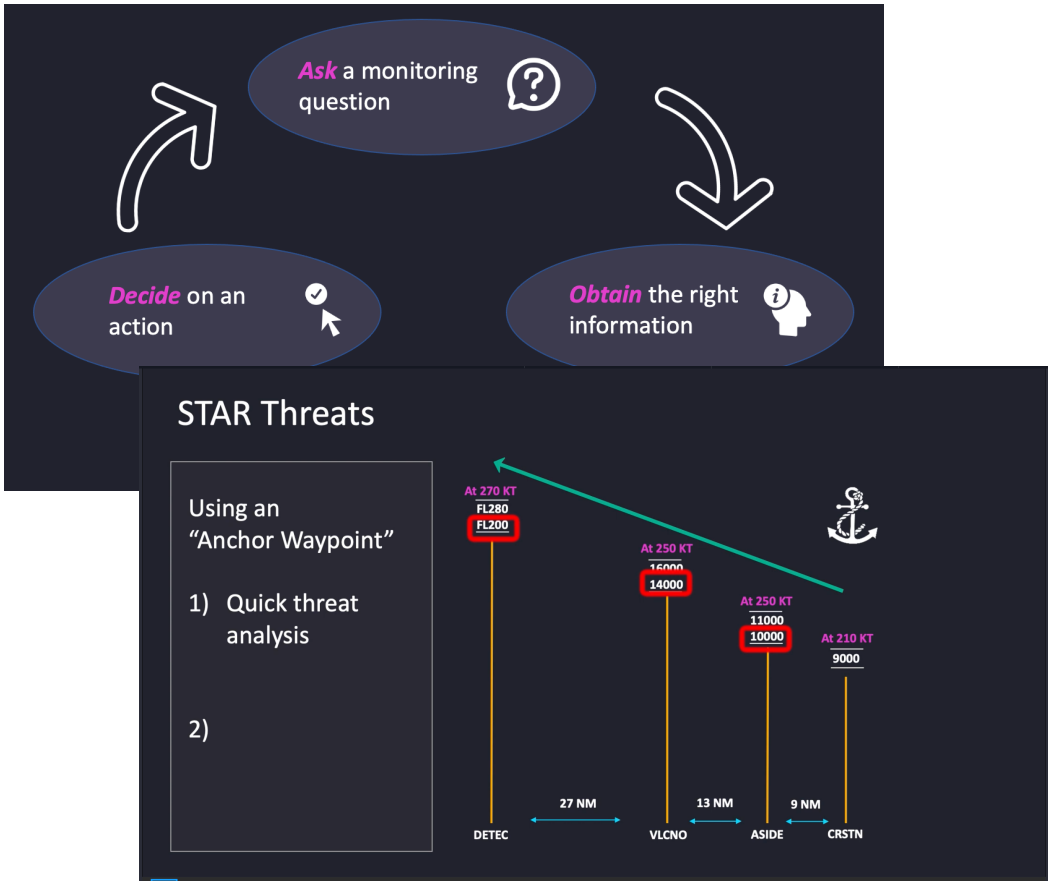


Training Approach: Content, Principles, Delivery

Crew Communication

Communication
GOAL:

Quality ✓

Quantity ⊘

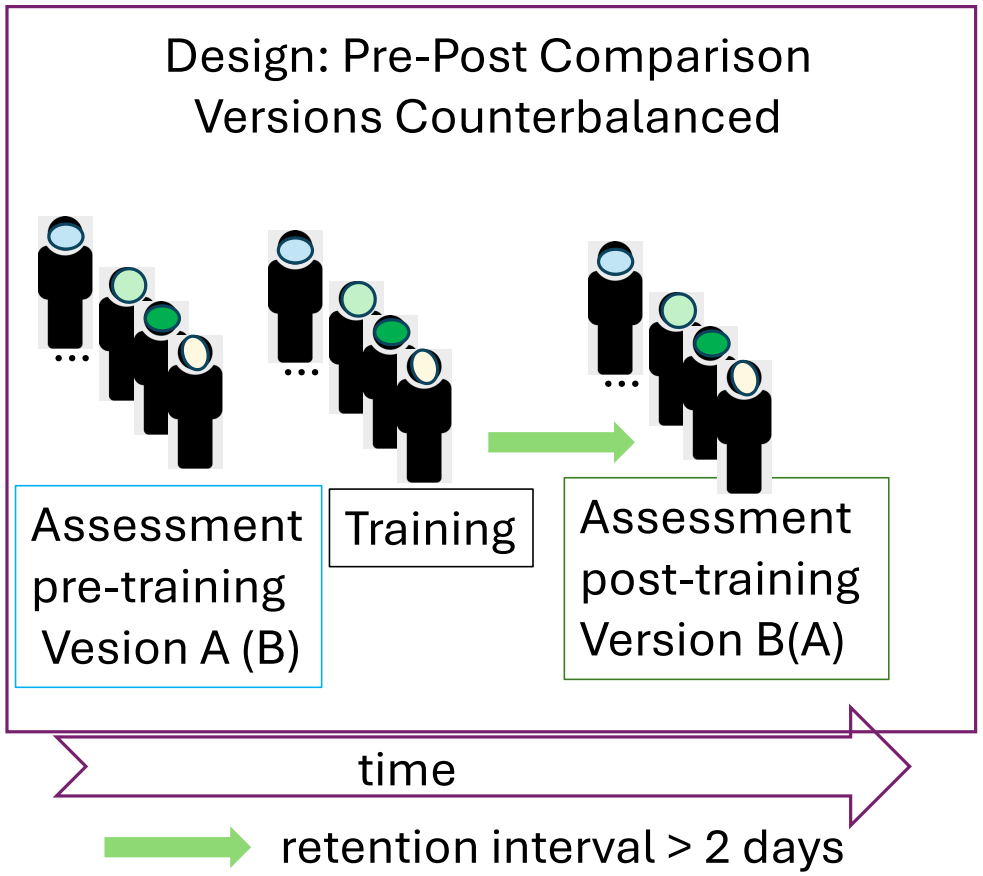
1) ***PF and PM:*** Share monitoring objectives

2) ***PF to PM:*** Verbalize planned actions

3) ***PM to PF:*** Verbalize when things deviate from what's expected

Evaluation

Study Design & Web-based Methods



Participants

38 Pilots in US airlines

Half Captains

8504 average flight hours

Study Design & Web-based Methods

Overall Web Method

At home, own computer.
Assessments in Qualtrics, linking into and out of learning module.
Tracked individual's progress, reminders.

Multiple Assessment Tasks

Briefing
ATC response
STAR Assessment
Multiple Choice
Rating Relevant Attitudes

[also: demographics, tutorial feedback ratings, 4 feedback narrative Q's]

MULTIPLE-CHOICE

15 x 2 items assessing tutorial topics

Web-based Methods- Multiple Choice Examples

Effective monitoring for flight path management typically includes: [mcb4]

- Using VNAV to provide accurate information about the aircraft's flight path.
- Cross-checking FMC constraints against Jepps and calling out FMA changes.
- Comparing expectations about waypoints with current progress.
- Ensuring that the descent briefing includes current weather and winds.

Core concept:
use expectations

Which is an effective method for creating energy margin when flying a STAR? [MCA11]

- Use autoflight guidance to fly the STAR; it ensures meeting all waypoint restrictions.
- Use "speed intervention" to fly a desired speed during descent.
- Change a waypoint altitude window to a hard altitude at the bottom the range.
- Put a lower cost index in the FMC to reduce speed during descent.

Energy Management Strategy:
ensure STAR is feasible

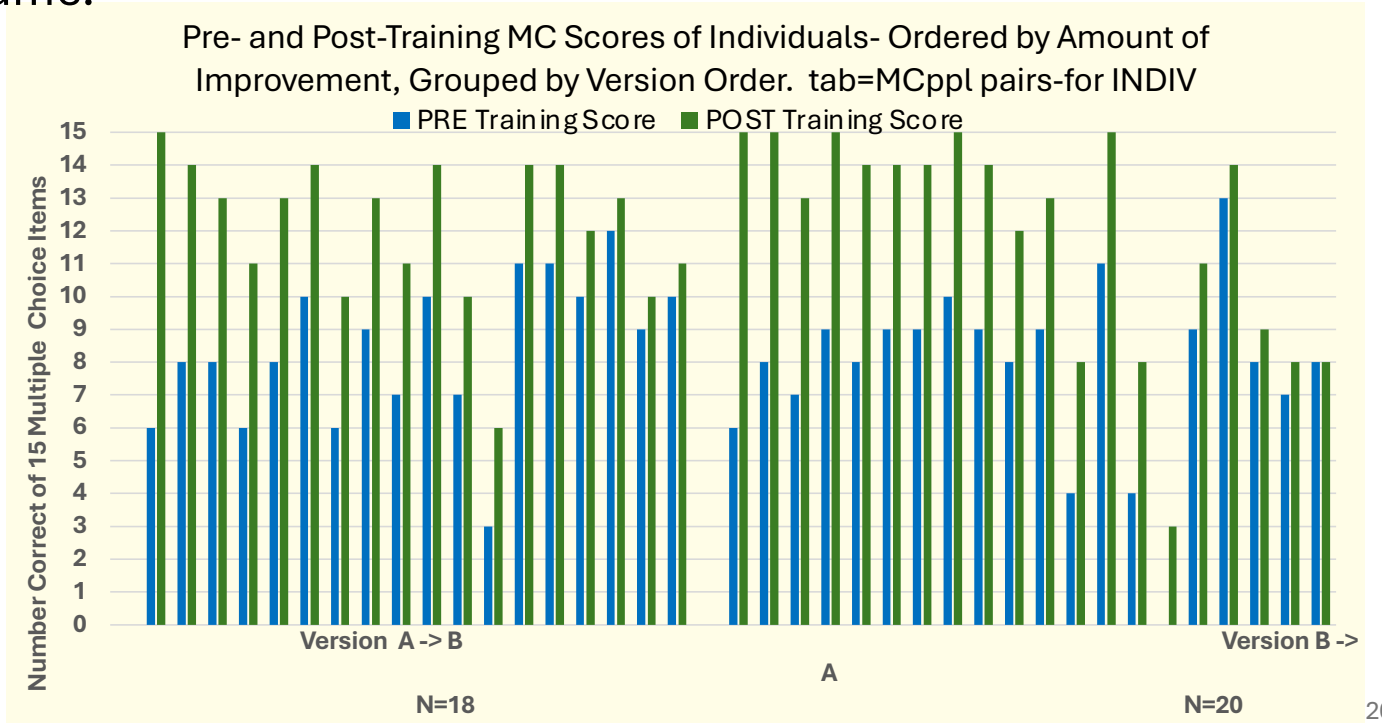
To elevate the role of the PM means that the PM should support flight path management in multiple ways. What's an example of something the PM could do that elevates their role in flight path management? [MCA9]

- To call out all FMA changes.
- To verbalize deviations from target speed.
- To call out excessive pitch attitude in the landing flare.
- To verbalize a challenging segment along a STAR.

Comm - PM role:
Don't just wait for a problem.

Multiple Choice Results

1) 37 of 38 pilots improved,
one stayed the same.

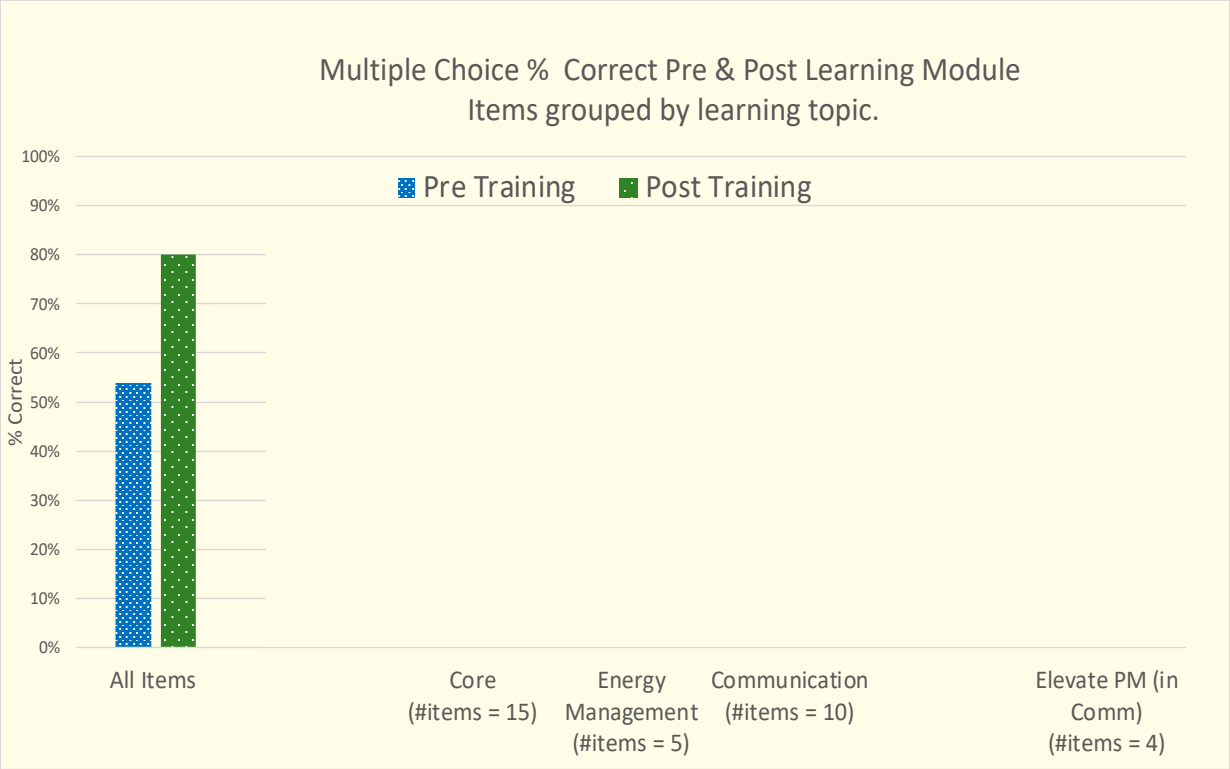


one stayed the same.

Multiple Choice Results

1) 37 of 38 pilots improved, one stayed the same.

2) Average performance increased by 26%



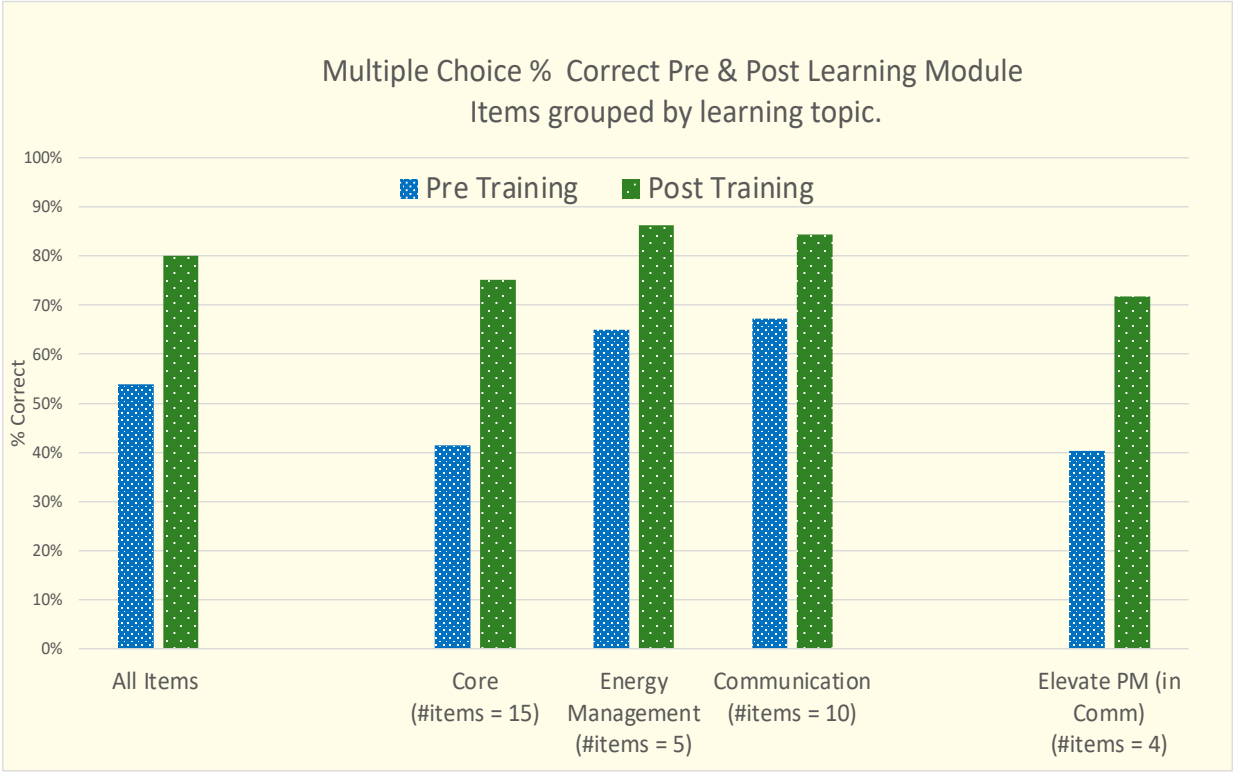
* χ^2= 100.8**, p <2e-16**; R mixed model regression with pre-post as fixed, participant and item as random effects

Multiple Choice Results

1) 37 of 38 pilots improved, one stayed the same.

2) Average performance increased by 26%

3) Broadly, more gain on less familiar topics.



Commentary on other tasks

Multiple Assessment Tasks

Briefing
ATC response
STAR Assessment
MULTIPLE-CHOICE
Rating Relevant Attitudes

[also: demographics,
tutorial feedback ratings,
4 feedback narrative Q's]

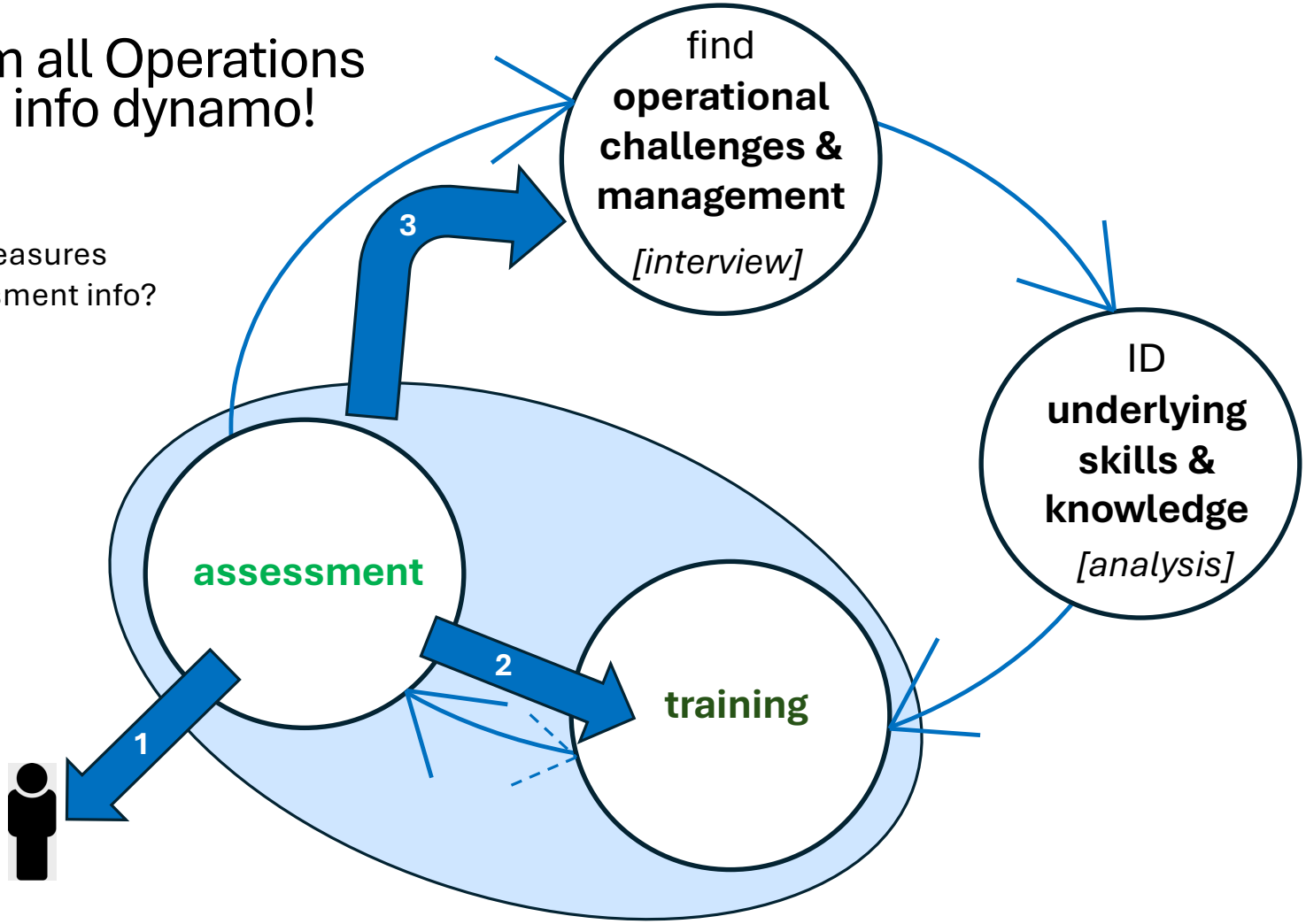
Big Picture

Big Picture

- Summary
  - innovative approach with promise
  - performance (not just affection)
- Data & Measurement Resources
  - rich data, assess relationships
  - value of developing measures for monitoring

Learning from all Operations Training is an info dynamo!

Better designed measures
Better used assessment info?



Big Picture

- Summary
  - innovative approach with promise
  - performance (not just liking)
- Data & Measurement Resources
  - rich data, assess relationships
  - value of developing measures for monitoring
- Limitations
  - transfer to different settings: simulator and operations
  - generalization (transfer) to other aviation situations or contexts (not just EM on descent)
- Future
  - Validation & exploration (external raters, correlations among tasks)
  - Simulator study
  - Inclusion of generalization scenarios.

Thank you