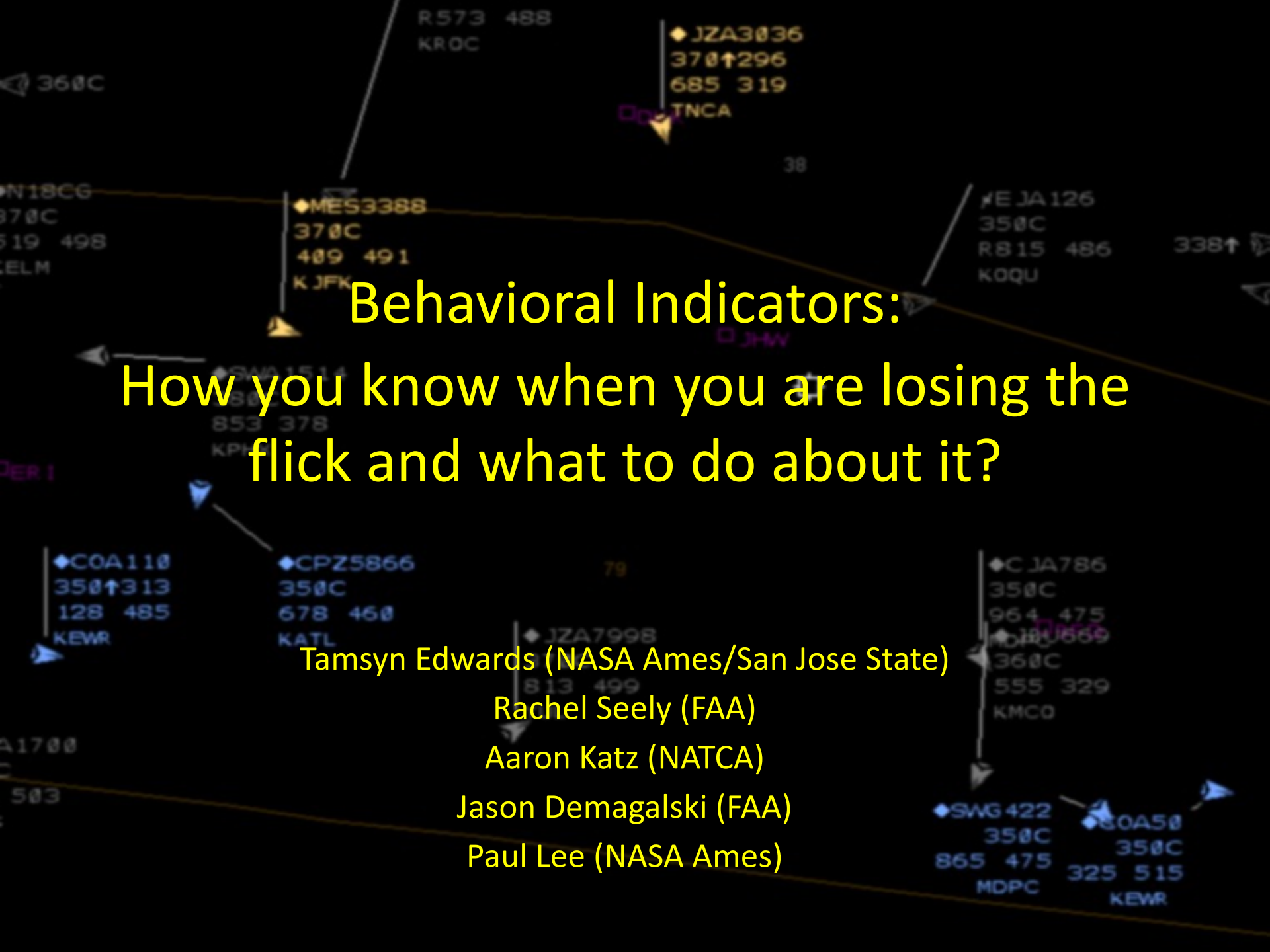




Behavioral Indicators: How you know when you are losing the flick and what to do about it?

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Introductions

- This brownbag will explore controller feedback on identifying and preventing non-optimal performance
 - 30-40 minute presentation with time for discussion
 - Interactive session – please ask questions or comments!
 - For more information, find the white paper at...
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Thank you!

- Rachel Seely, Jason Demagalski (Human Performance team)
- Aaron Katz (NATCA)
- National and local NATCA REP
- ATC facilities and all the controllers (65) that took part!

THANK YOU!



Background

- Air Traffic Management is an 'ultra-safe' industry
- Remains highly 'human-centric' – real-time operations
- Mitigations defend against incidents, but still occur
- Need to know when controllers are approaching the edges of acceptable performance

Background (2): Why did we do this?

- Overall Aims
 - Identify indicators of potential performance decline
 - Identify indicators commonly associated with performance influencing factors
- Potential Outcomes
 - Better understanding of 'difficult' human performance factors in Air Traffic Control (ATC)
 - Signs and symptoms that performance is threatened

Controller Interviews

- Interviews conducted with 65 air traffic controllers from three facilities:
 - 22 Tower, 23 TRACON, 20 En-route
 - Experience:
 - Trainees (3 months – 2 years post academy) and newly certified
 - OJTs
 - Operational supervisors (7) and Controller in charge
 - Example questions:
 - ‘How do you know when you’re having a bad day?’ ‘How do you see this in colleagues?’
 - What do you do if you notice that you or a colleague may not be on top of your game that day?
 - Are indicators specific to influencing factors e.g. fatigue?
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Key findings

- Summary
 - What are indicators?
 - Indicators are used to support performance
 - Learned through experience, but similar between controllers
 - Awareness of indicators is critical to performance
 - Indicators are specific to specific influences e.g. fatigue
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1: Indicators are used by controllers

- 64/65 controllers agreed that indicators are used as a cue when self or colleagues may not be comfortable

You can feel it starting to go. When things are starting to surprise you, that's not a good sign" (Participant 10, TRACON).

"If you see somebody with three inches between their face and the screen, it's like oh, this guy's going down. And so, those are all visual indicators. You usually know" (Participant 7, En-route). "

- The remaining one controller was a trainee who was 3 months post-academy
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2: Indicators can be internal & external

- Internal:

“When I started getting overwhelmed I started getting more tunnel vision, meaning that I’m not doing my scan, I’m missing maybe read-backs, or I start messing up call signs... that’s when I’m asking for help or trying to get that before it gets to that point (Participant 19, TRACON)”.

2: Indicators can be internal & external

- External:

- Performance decline

“Phraseology definitely breaks down when they’re having a bad day. Coordination with other facilities becomes more of a conflict as opposed to, “I can do that for you.” (Participant 12, Enroute).

- Physical changes

“You'd notice the tics and nervousness start to come in. Or somebody might start fidgiting a little bit, talking louder. That’s the point they're starting to lose it there (Participant 1, Tower)

- Adaptive changes

“When somebody is just extra careful, I suppose that it’s because they feel that they have to be extra careful”

3: Indicators support performance

- Controllers use indicators for information on when they are reaching the edge of performance, or when a colleague is reaching a performance edge

“Who was that? I’ve talked to him before. Where is he?” ...You start to recognize that you’re losing the picture” (Enroute CPC)

- Control strategies ‘from the toolbox’ are then used to protect performance, for themselves or colleagues

“Usually, if you notice it, you can help. You can just point it out or say something (Tower CPC)”

- Change control strategy
 - Conservative control
 - Easy solutions
 - Increase safety buffer
 - Pay attention
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4: Indicators are learned

- Indicators are learned through experience
 - But, this means that controllers rarely talk about indicators as they are developed through habit.

“100%, it has to do with experience. [Something] scared us.... you’re going to remember every single time (Enroute CPC)”

- Trainees do not have the experience with their own indicators of reaching a performance edge, and do not know how to deal with it

“[Trainees] don’t have as much in their toolbox so don’t keep up ... keeping safe and conservative” (TRACON OJTI)”

5: Indicators are the same across CPCs

- Some markers depended on the individual...
 - But many were reported by all CPCs
 - In general, similarity between CPCs was unexpected:
“Everyone is so different on how they interact with people. So, to generalize it, it'd be very tough. (Participant 5, TRACON). The
 - Implications for use with new crew for supervisors, new OJT, and trainees
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6: Awareness of indicators

- Awareness of indicators is critical to supporting performance
- Without awareness, control strategies will not be used to support and maintain performance

“The most important [tool] is awareness of this is right, and this seems out of place. If you can stay within yourself and understand where you are, whether you’re a 25-year vet or the person who is coming out of the academy, that’s what keeps you from going down the tubes.” (TRACON CPC).

- Individual differences exist in awareness of indicators:
 - Trainees or new CPCs
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Result 7: Indicators of factor influences

- ‘Are there indicators which relate specifically to a performance-influencing factor?’
 - Workload
 - Fatigue
 - Stress
 - Losing the picture
 - Communications



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Indicators of workload

- Different indicators were identified for high workload and low workload:
- High workload:

Category	Internal Marker
Cognitive changes	Don't know the next steps
	Increased focus
	Calls are a surprise
	Reduced self-awareness
Subjective feeling	Losing control
	More traffic than can handle
	Panic and uncertainty
	Not comfortable

Category	External Marker
Perception changes	Can't talk to executive/ executive doesn't hear you
Visible cues	Fidgety
	Move closer to screen
	Colleagues not talking
Verbal cues	Swearing
	Blaming others
Performance changes	Miss actions
	Mixing call signs

Indicators of workload

- Low workload:

Category	Internal Marker
Cognitive changes	Pay less attention
	Easily distracted
	Reduced self-awareness
Changes to control	Leave situations develop
	Trying to create more complex situations
	Less safety buffer
Subjective feeling	Boredom
	Relaxed

Proposed category	External Marker
Perception changes	Incorrect assessment of a situation
Visible cues	Sit back in chair
	Away from radar screen
	Talking to colleague
Performance changes	Overlooking aircraft
	Forgetting aircraft
	Repeated 'sloppy' mistakes
	Fall behind traffic due to distraction

Indicators of fatigue

“Those are two completely different things. [Mental fatigue] You could hear the door open, and you're screaming for him to help you out” (Participant 1, Tower).

Cognitive changes	Subjective experience
Concentration issues	More effort to control
Increased assumptions	Don't want to work busy traffic
Slower	Force self to pay attention
Mild confusion	Feel tired
Reduced awareness	Not looking forward to shift

Visible cues	Demeanour
Yawning	Less active
Laid back	Not as confident
Eyes closed	Quieter
Falling asleep	Distracted

Style of control	Performance
Less flexible	Overlook aircraft
Reduction in efficiency	Multiple, small mistakes
Less safety buffer	‘Running behind traffic’
Incorrect plan	Slow to solve problems
Slower communications	Forget aircraft

Losing the picture

- Differentiation between markers that indicate losing the picture, and having lost the picture:

*“If you don't get catch it – it's easy to drown faster when you're already drowning—you get the first one [aircraft] and something happens. You're so focused on that, that when the other four get in you don't have time to sit there and do your plan.
(Participant 14, Enroute)*

Category	Internal Marker
Cognitive changes	Difficulty selecting priorities
	Thinking whilst giving the clearance
	Tunnel vision/hearing
Subjective feeling	Under confident

Category	External Marker
Visible cues	Slow at task
Performance changes	Running behind
	Time working ahead degrades
	Missing calls

Why do factors affect performance?

- **Cognitive Resources**

- The harder the task, the more cognitive resources, 'high workload'.
- Cognitive resources can be depleted by fatigue and stress
- Implications for CPCs during pandemic

High Workload



Overload



Low Workload, Boredom



Reduced Resources



Result 8: Findings for Supervisors

- Supervisors look for indicators in others
 - However, indicators to look for are learned from experience
 - What to do with the information is also learned from experience
 - Responding proactively to controller indicators was reported to be supportive

“You shouldn't need the controller to say, ‘Maybe I need a set of eyes.’ Because then it'd be too late (Participant 5, TRACON)”
 - However, approaches to supporting controllers varied
 - Awareness of common indicators may support supervisors in new facilities
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*What do we do with this
information?*

Applications - Trainees

- Trainees
 - Explicitly training skills that are usually developed through years of experience
 - Builds self/other awareness and skills to manage performance
 - Options of implementation include:
 - Integration of a module in academy training
 - Debriefs can include self-awareness reflections on indicators for self and colleagues
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Applications - Op Supervisors

- Supervisors
 - Include materials for supervisor training on:
 - Common indicators
 - Identifying controllers at a performance edge
 - Strategies to support controllers
 - Especially relevant for supervisors placed in new facilities and/or airspace sectors
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Applications – Post-pandemic

- Indicators for supporting performance during pandemic
 - Low workload
 - Increasing traffic levels
 - Raise awareness of common markers
 - Q&A sessions
 - Briefings
 - Share compensation strategies that support performance
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Conclusions

- Indicators are used in by controllers to infer:
 - Controller reaching the edge of performance
 - Specific factors influencing controller performance
 - Factors (e.g. workload) are associated with specific indicators
 - Indicators are learned through experience
 - Trainees may not be aware of own or others' indicators
 - Awareness of indicators supports use of compensation strategies
 - Indicators are essential to supporting and maintaining performance
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Thank you!

