A quantitative methodology for identifying attributes which contribute to performance for TSA officers

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Talk Overview

- Scope of the project
- Quantitative-based methodology
- Strengths and weaknesses
- Generalizing this method to non-TSA contexts

Scope of the project

- The **purpose** of the checkpoint is to identify and locate threatening material.
- TSOs are expected to show **high performance,** through their interactions with passengers, to maintain a safe, secure checkpoint.
- TSOs must demonstrate a number of **cognitive attributes** to perform well at their job:
  - e.g., communicate, decide, show authority, etc.



Scope of the project

Measure performance	*Measure cognitive attributes*

1. ***How valid are measures shown to successfully predict TSO performance?***
2. ***Are we able to use a battery of cognitive assessments to help TSA identify high performing TSOs?***



Quantitative-based methodology

Measuring cognitive attributes

***Cognitive Attributes** = knowledge, skills, and abilities (KSAs); attitudes, aptitudes, and attributes (AAAs) that TSOs have to perform.*

- KSAs - used the standard I/O method – a Job Task Analyses
- AAAs – TSA Subject matter experts ranked what competencies were most important to the job; self-report measures were mapped to measure the underlying AAAs

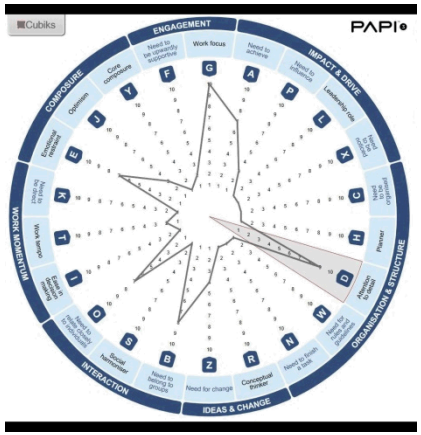
Efficient, Careful Decisions

Decision Making Questionnaire

Please show how often each of the following applies to you by circling the number that you think applies. 1=very infrequently or never, 2=infrequently, 3=quite infrequently, 4=quite frequently, 5=frequently, 6=very frequently or always.

		Very infrequently or never					Very frequently or always
1.	Do you enjoy making decisions?						
2.	Do you rely on 'gut feelings' when making decisions?	1	2	3	4	5	6
3.	Do you like to consult with others?	1	2	3	4	5	6
4.	Do you stick by your decisions come what may?	1	2	3	4	5	6
5.	When you find one option that will just about do, do you leave it at that?	1	2	3	4	5	6
6.	Do you remain calm when you have to make decisions very quickly?	1	2	3	4	5	6
7.	Do you feel in control of things?	1	2	3	4	5	6
8.	How often are your decision governed by your ideals regardless of practical difficulties?	1	2	3	4	5	6
9.	Do you make decisions without considering all of the implications?	1	2	3	4	5	6
10.	Do you change your mind about things?	1	2	3	4	5	6
11.	Do you take the safe option if there is one?	1	2	3	4	5	6
12.	Do you prefer to avoid making decisions if you can?	1	2	3	4	5	6
13.	Do you plan well ahead?	1	2	3	4	5	6
14.	When making decisions do you find yourself favouring first one option then another?	1	2	3	4	5	6
15.	Do you carry on looking for something better even if you have found a course of action that is just about OK?	1	2	3	4	5	6
16.	Do you find it difficult to think clearly when you have to decide something in a hurry?	1	2	3	4	5	6
17.	Do you make up your own mind about things regardless of what others think?	1	2	3	4	5	6
18.	Do you avoid taking advice over decisions?	1	2	3	4	5	6
19.	Do you work out all the pros and cons before making a decision?	1	2	3	4	5	6
20.	In your decision making how often are practicalities more important than principles?	1	2	3	4	5	6
21.	Is your decision making a deliberate logical process?	1	2	3	4	5	6

Command Presence



Visual Acuity

Also available on

Google Android Mac OS X Windows

Quantitative-based methodology

Measuring performance

❖ **Performance =**

- Able to maintain secure, safe checkpoint
- Optimally completes their checkpoint duties
- Works well in a team

❖ **Establish TSA-based performance metrics**

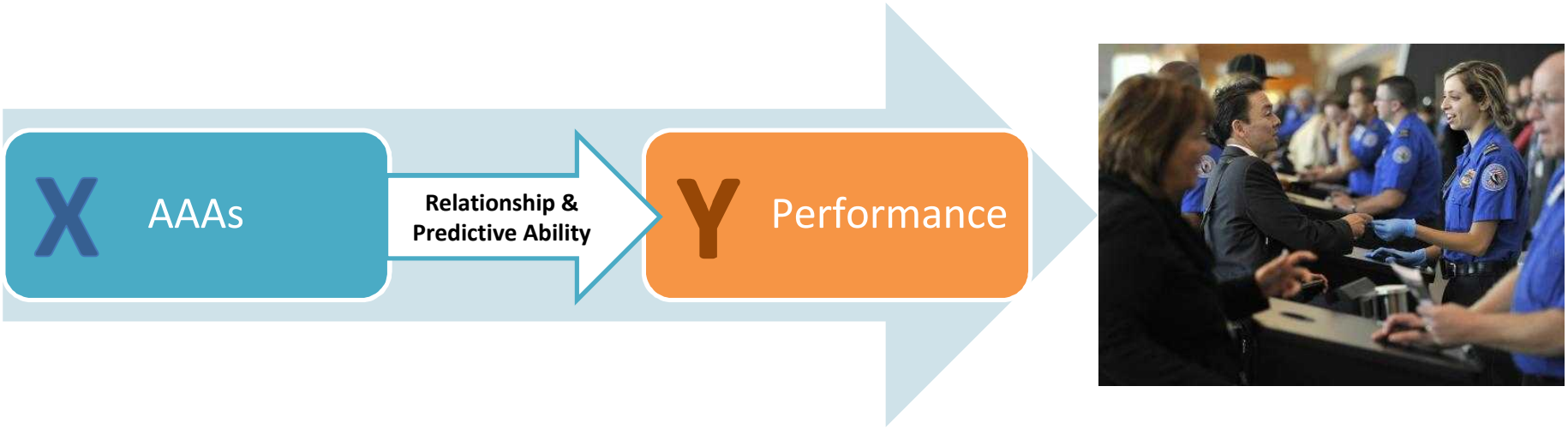
- Content Validity & Convergent Validity

❖ **Identify quantitative metrics (already existing)**

- Performance scores
- Attendance
- Awards, etc.

Quantitative-based methodology

Analyzing how cognitive attributes impact performance

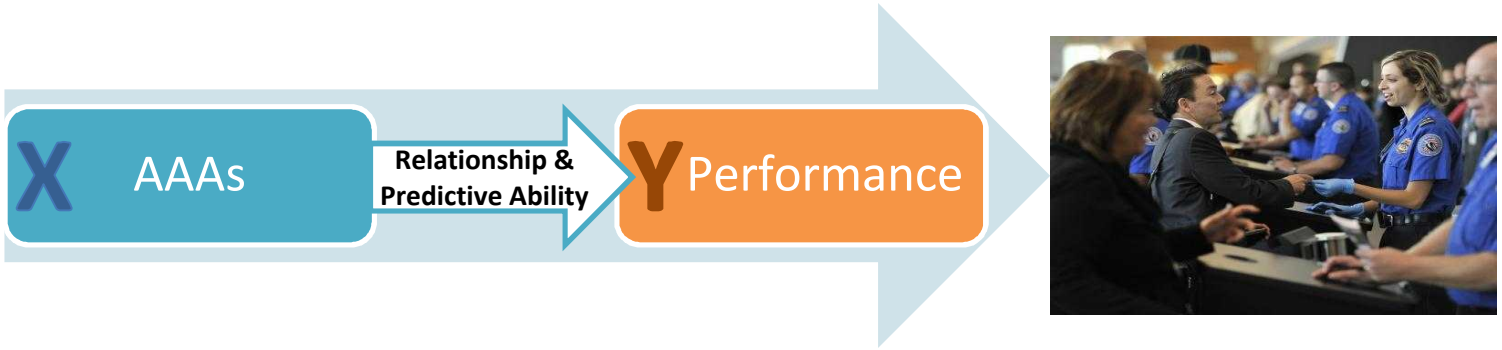


Data analysis answers the questions:

- What are our predictors (x)?
- What are our performance variables (y)?
- What is the relationship between the two (x – y)?
- What does this relationship mean for TSA?

Quantitative-based methodology

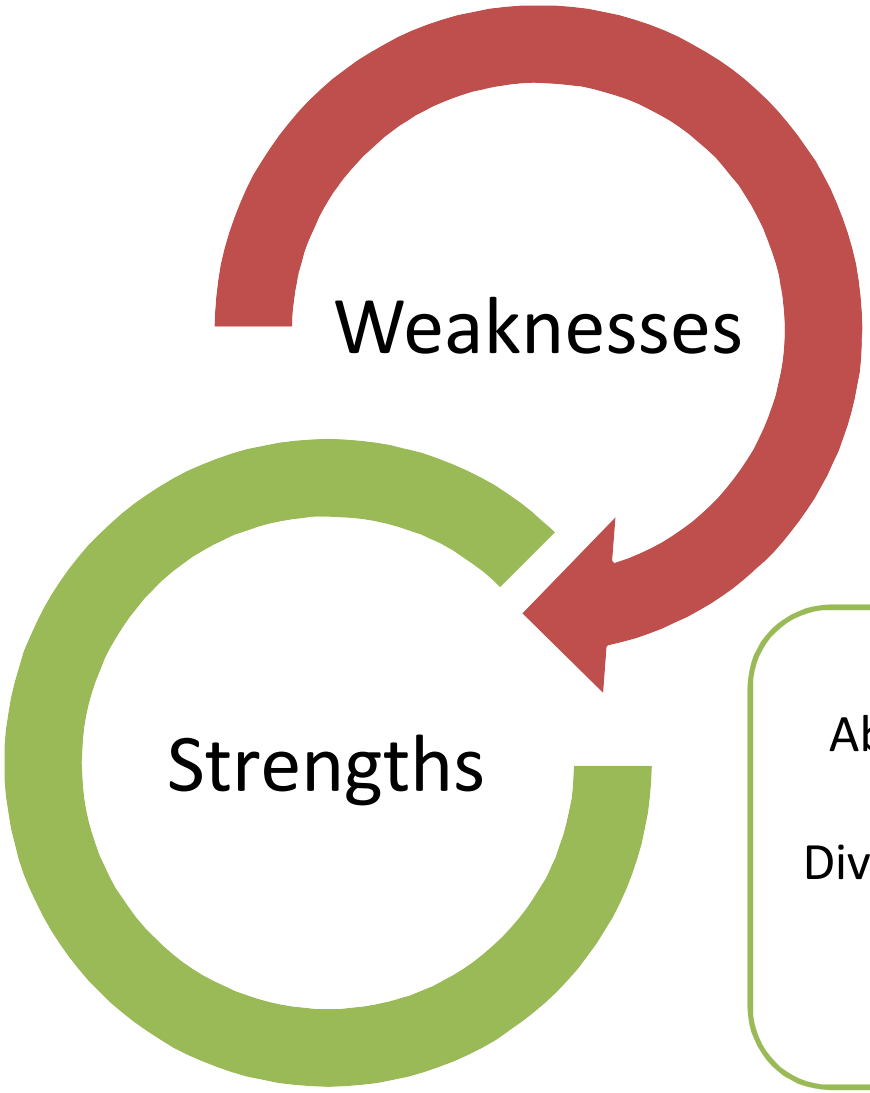
Analyzing how cognitive attributes impact performance



Process for Data Analysis

- **Factor Analysis – are we measuring what we say we are measuring**
- **Hypothesis Testing**
  - Correlation - What is the relationship between x & y
  - Linear regression - How does x predict y
  - Profile analysis – What attributes show high performers to be different from low performers?
  - MANCOVA – What multiple AAAs predict performance while controlling for other variables (e.g., IQ)

Strengths & Weaknesses



Limited metric of performance

Qualitative data not included

Dynamic environment

Ability to measure latent variables

Diverse, large sample across airports

Portability of data collection

Application to non-TSA contexts

Needed ingredients for study

Performance metrics

Critical AAAs/KSAs
(JTA very helpful)

Hypotheses informing analyses

- Cyber security
- Impact of workplace environment
- Analysts in military contexts
- National security contexts
- Industry
- Academia
- Government Agencies

Other Sandia Cognitive Science Program research areas

Questions & Comments