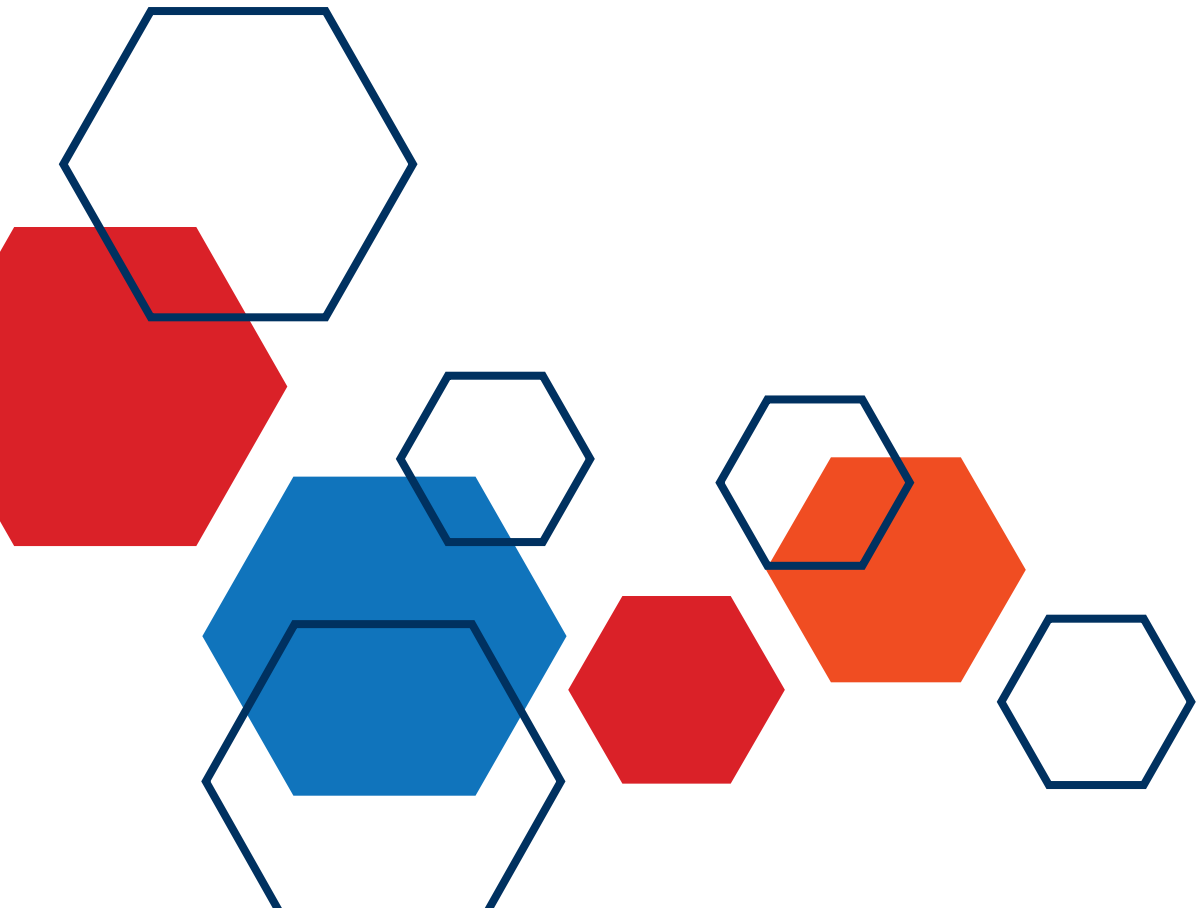
Human Factors in Aviation: How Hogan Can Help



Introduction

Human factors is commonly understood to be the study of people's performance. CASA use the SCHELL model, which has been modified from Edwards (1972) and Hawkins (1987), to help understand the components of human factors. Table 1 outlines these components.

Table 1. Schell Components

SCHELL Components	
Software:	the procedures and other aspects of work design
Culture:	the organisational and national cultures influencing interactions
Hardware:	the equipment, tools and technology used in work
Environment:	the environment conditions in which work occur
Liveware	the Human aspects of the system work
Liveware:	the interrelationships between humans at work

CASA stipulated that human factors training should focus on providing aviation safety-critical personnel (such as pilots and cabin crew) with non-technical skills training to help reduce human error. CASA refers to non-technical skills training as 'the decision making and social components that complement technical skills' (p.3).

In 2009 CASA produced a resource guide called 'Safety Behaviours: Human Factors for Pilots' within which the following non-technical skills were outlined:

- Managing fatigue
- Managing stress
- Alcohol and Other Drugs (AOD)
- Team-based cooperation and coordination
- Decision making
- Situational awareness
- Communication
- Leadership

Methodology

Hogan Research investigated whether there was a relationship between the personality scales from the Hogan Personality Inventory (HPI) and the Hogan Development Survey (HDS) with the non-technical skills outlined above. Tables 2 and 4 provide information on the HPI and HDS scales. Generally HPI scales were positively correlated to the non-technical skills whereas the HDS scales were negatively correlated to the non-technical skills as the HDS typically measures reactions to stress and pressure.

Table 2. HPI Scale Names and Description

Scale Name	Description
Adjustment	The degree to which a person appears calm and self-accepting, or conversely, self-critical and tense
Ambition	The degree to which a person seems socially self-confident, leader-like, competitive and energetic
Sociability	The degree to which a person seems to need and/or enjoy interacting with others.
Interpersonal Sensitivity	The degree to which a person is seen as perceptive, tactful and socially sensitive.
Prudence	The degree to which a person seems conscientious, conforming and dependable.
Inquisitive	The degree to which a person is perceived as bright, creative and interested in intellectual matters.
Learning Approach	The degree to which a person seems to enjoy academic activities and to value educational achievement for its own sake.

Table 3. HDS Scale Names and Description

Scale Name	Description
Excitable	Moody, easily annoyed, hard to please and emotionally volatile
Sceptical	Distrustful, cynical, sensitive to criticism and focused on the negative.
Cautious	Unassertive, resistant to change, risk-averse and slow to make decisions.
Reserved	Aloof, indifferent to the feelings of others, and uncommunicative.
Leisurely	Overtly cooperative, but privately irritable, stubborn and uncooperative.
Bold	Overly self-confident, arrogant, with inflated feelings of self-worth.
Mischievous	Charming, risk-taking, limit-testing and excitement-seeking
Colourful	Dramatic, attention-seeking, interruptive and poor listening skills.
Imaginative	Creative, but thinking and acting in unusual or eccentric ways.
Diligent	Meticulous, precise, hard to please, and tends to micromanage
Dutiful	Eager to please and reluctant to act independently or against popular opinion.

Hogan Research first mapped the available Hogan competencies to the non-technical skills outlined by CASA. Then using archival data, meta-analyses were conducted to assess what relationships existed between the HPI and HDS scales and the non-technical skills. Hogan then conducted regression analyses to determine the HPI and HDS scales most predictive of the non-technical skills specified by CASA.

Findings

A number of scales which included Adjustment, Ambition, Sociability, Prudence, Inquisitive and Learning Approach from the HPI, and Excitable, Sceptical, Cautious, Reserved, Leisurely, Bold, Colourful and Imaginative from the HDS predicted the non-technical skills to a degree. Table 4 highlights the non-technical skills outlined by CASA, the Hogan competencies mapped to these non-technical skills, corresponding HPI and HDS scales that map to the Hogan competencies and strength of the relationship of the scales to the specified competencies.

Table 4. Mapping Hogan Scales to Non-Technical Skills

Non-Technical Skills	Hogan Competencies	HPI Scales	HDS Scales	R2
Managing Stress	Stress Tolerance	Adjustment & Prudence	Excitable & Sceptical	R2 = .33
Teamwork	Teamwork	Adjustment, Interpersonal Sensitivity & Prudence	Excitable & Bold	R2 = .43
Decision Making	Decision Making	Adjustment & Ambition	Sceptical & Leisurely	R2 = .37
Situational Awareness	Vigilance	Sociability* (low) & Prudence	Reserved** & Colourful	R2 = .29
	Detail Orientation	Adjustment & Prudence	Imaginative & Excitable	R2 = .32
Communication	Written	Sociability & Learning Approach	Imaginative & Excitable	R2 = .35
	Oral	Adjustment & Ambition	Excitable, Cautious & Reserved	R2 = .35
Leadership	Leadership	Adjustment, Sociability & Ambition	Sceptical & Leisurely	R2 = .46

Notes: * Indicates that this HPI scale had a negative relationship to the non-technical skills.

** Indicates that the HDS scale had a positive relationship to the non-technical skills.

Summary

Table 4 shows that scales from the HPI and HDS can be used to explain some of the variance of the non-technical skills required in the training of safety-critical personnel. Organisations can therefore use Hogan assessments to help predict the non-technical skills required for safety-critical personnel in the Aviation Industry.

References

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