



14-16 May 2019

Stockholmsmässan, Sweden



Human Performance Interoperability

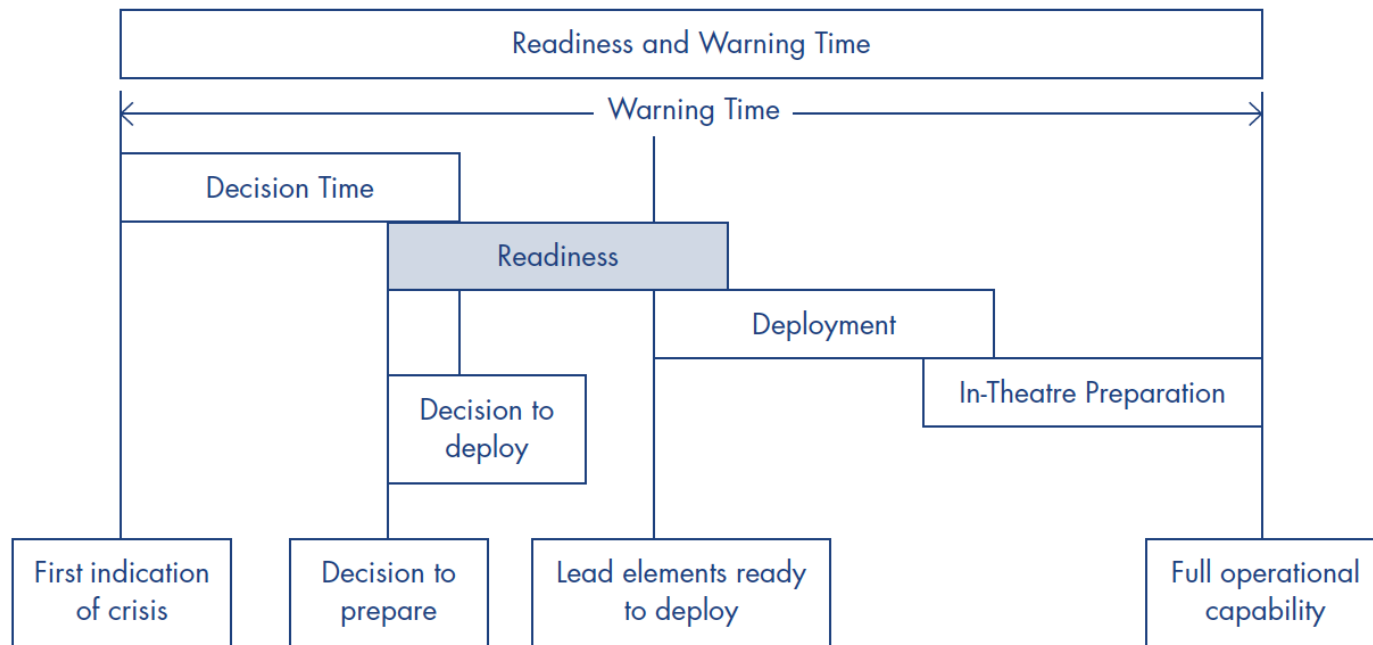
Using cognitive and behavioral analytics in immersive, adaptive working environments

 #ITEC2019

INTEROPERABILITY & READINESS

2 Readiness and Warning Time

Readiness comprises one of four elements that make up Warning Time, the others consist of Decision Time, Deployment, and In-Theatre Preparation.



Source: Ministry of Defence

WHAT DOES “PERFECT READINESS” LOOK LIKE?

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“The cost of keeping forces ‘ready’ for contingencies has to be balanced against the likelihood of such contingencies occurring and the warning and preparation time available to respond.

ASSESSING READINESS

KEY QUESTIONS:

Knowing that perfect readiness is not possible, what can we do?

Where are the gaps?

How can we do better?

ASSESSING READINESS

KEY QUESTIONS:

Knowing that perfect readiness is not possible, what can we do? [Calibration](#)

Where are the gaps? [Decision making](#)

How can we do better? [More meaningful data on human performance](#)

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ASSESSING FOR READINESS & INTEROPERABILITY

1. It must conform to an up-to-date, universally applicable model of learning, human development and expertise.
 - a) Standardized training procedures
 - b) Shared assessment and evaluation protocol
2. Focus on decision making
 - a) More meaningful data, not just more data
 - b) It must have as its core benefit the skill of adaptability.

OUR DEFINITION HUMAN PERFORMANCE INTEROPERABILITY

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The ability to generate and share meaningful human performance data

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OUR DEFINITION

HUMAN PERFORMANCE INTEROPERABILITY

The ability to generate and share meaningful human performance data from standardized assessment and evaluation protocol, rooted in a universal model of human learning and expertise development that meaningfully measures and develops adaptive skills to enable effective joint operation.

THE PROBLEMS

Why human performance factors are overlooked

1. Incompatible assessment frameworks and learning models
2. Human behavior viewed as inherently unpredictable/immeasurable
3. Insufficient opportunities for testing assessment models
4. Insufficient data on cognitive factors
5. Lack of funding for human performance factors
6. Individual training disconnected from collective training
7. How ready can we/do we need to be?

THE SOLUTION: ADAPTIVE TRAINING

Adaptive training addresses many of these problems

1. Single platform for individual and collective training
2. Focuses on cognitive factors (e.g., sensemaking, pattern matching)
3. Trains for complex, uncertain, anomalous conditions
4. Utilizes a universal learning model
5. Targets unique learning styles
6. Provides a shared rubric for facilitation

CASE STUDY

Case study

Client: Babcock

User: Royal Navy - Flag Officer Sea Training (FOST)

Role: Ship Control Officer of the Watch

Material Goal: Reduce the Sea Burden

Learning Goal: Shift from “Proficient” to “Expert”



overview

Goals: Reach target, gather information.

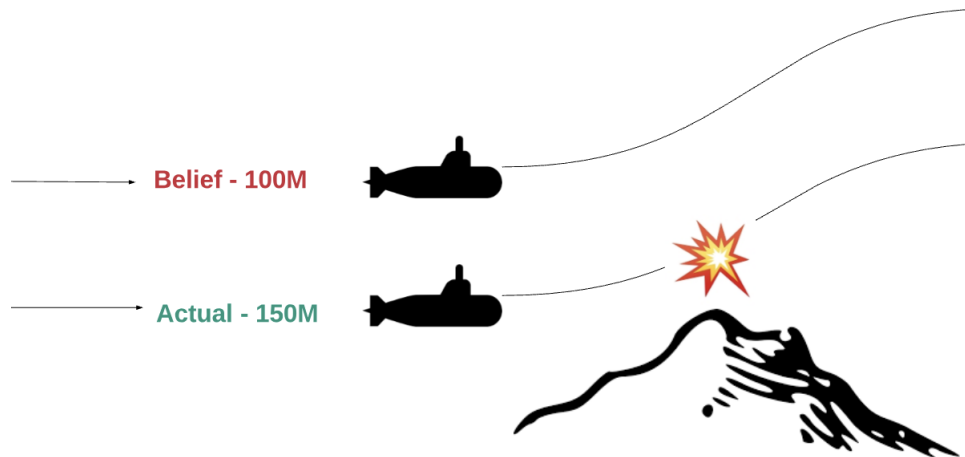
Maintain safety of the crew

Apparent Problem:

Collision, source unknown

Actual Problem:

Digital depth gauge inaccurate



tactical

Real time facilitator ratings of routines, terminology and tactical maneuvers allow for basic competency assessment and gather evidence about individual learning styles



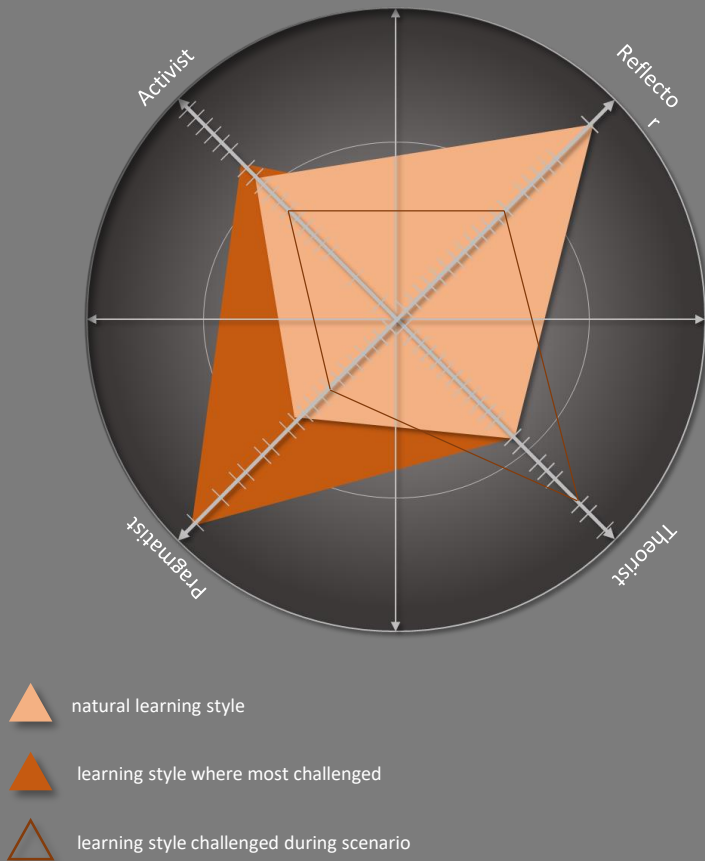
Disaster response

Real-time facilitator ratings can evaluate decision making as the exercise unfolds

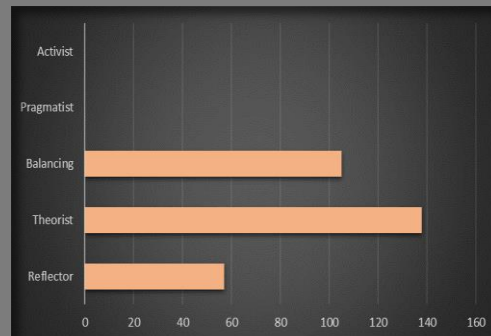


RESULTS

Novice User

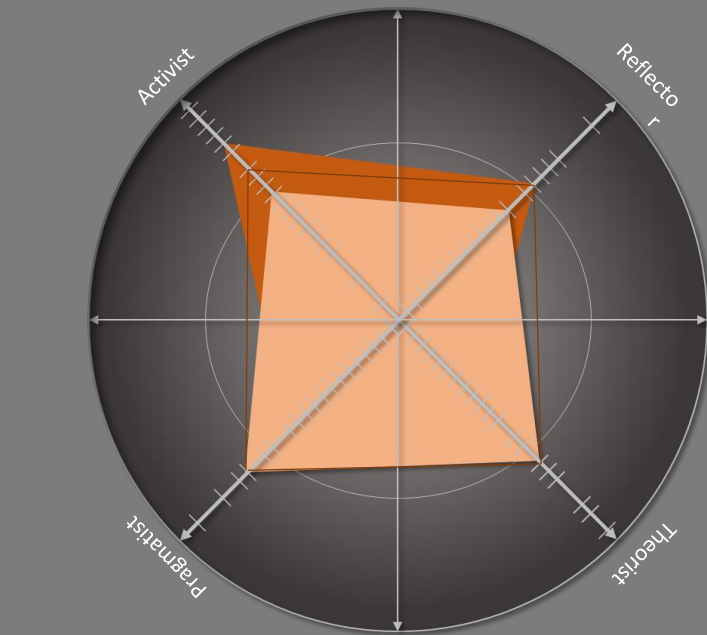


Learning Style

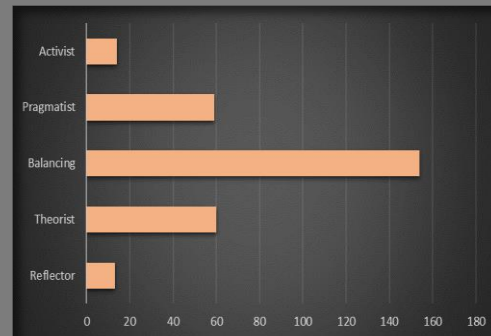


Learning Style Change

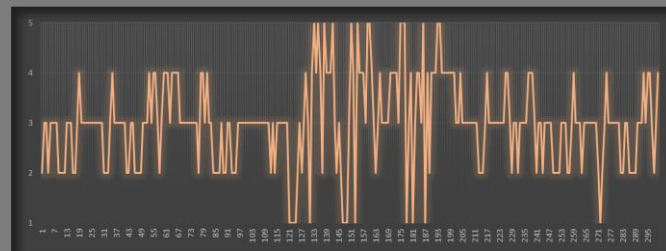


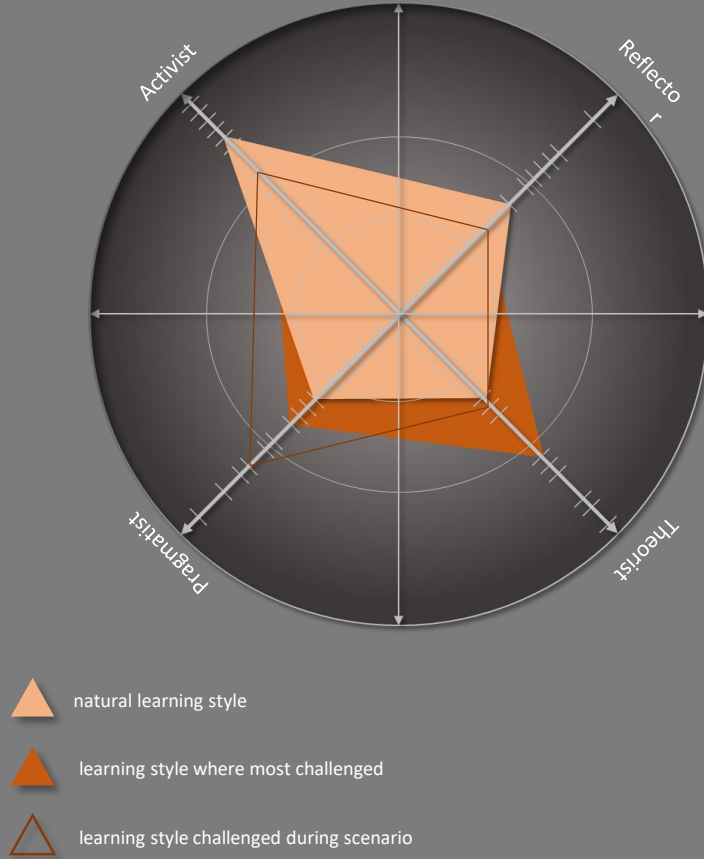


Learning Style

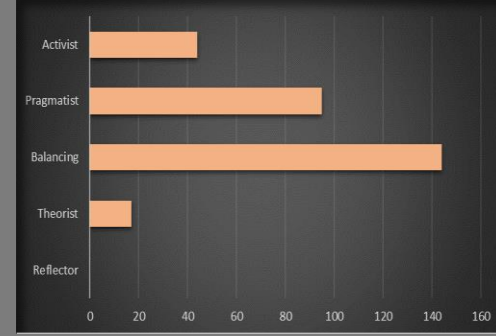


Learning Style Change

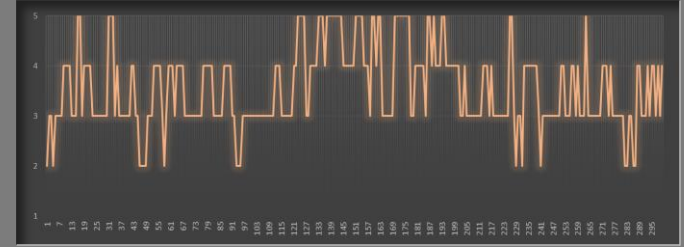




Learning Style

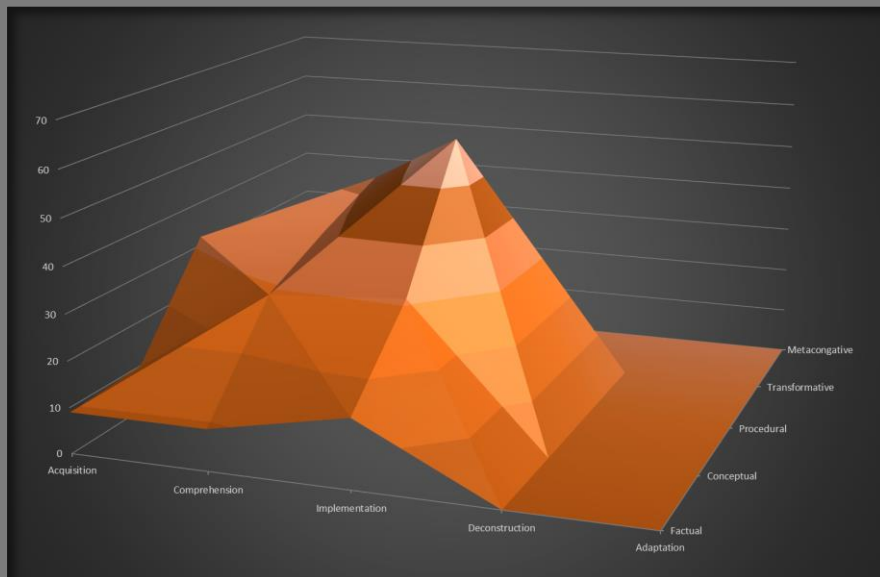


Learning Style Change

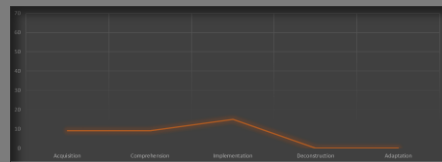
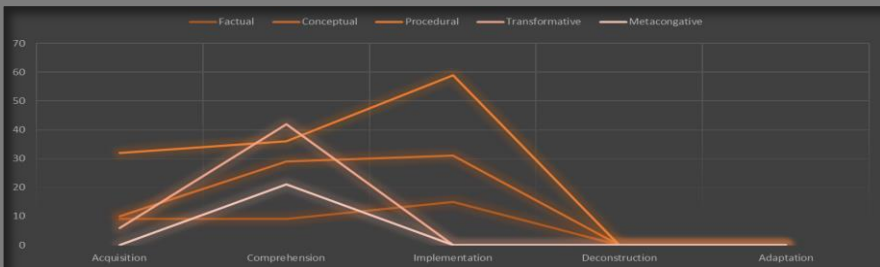


Novice User

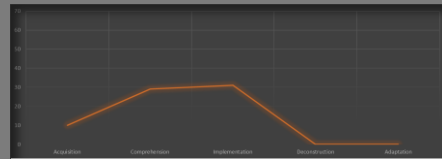
Cognitive Surface Map



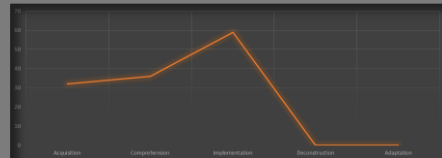
Cognition



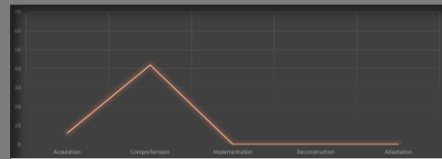
Factual



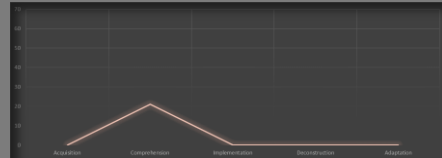
Conceptual



Procedural



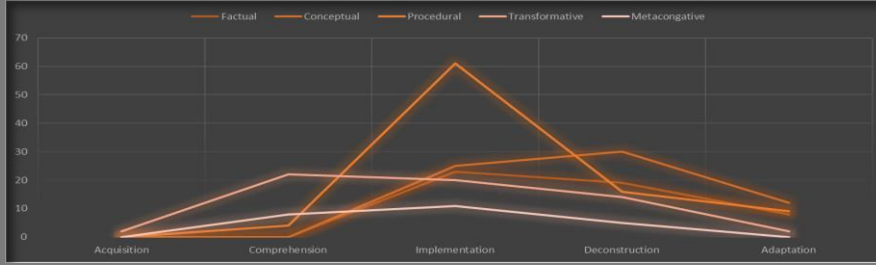
Transformative



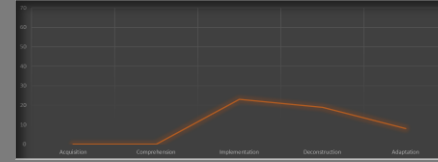
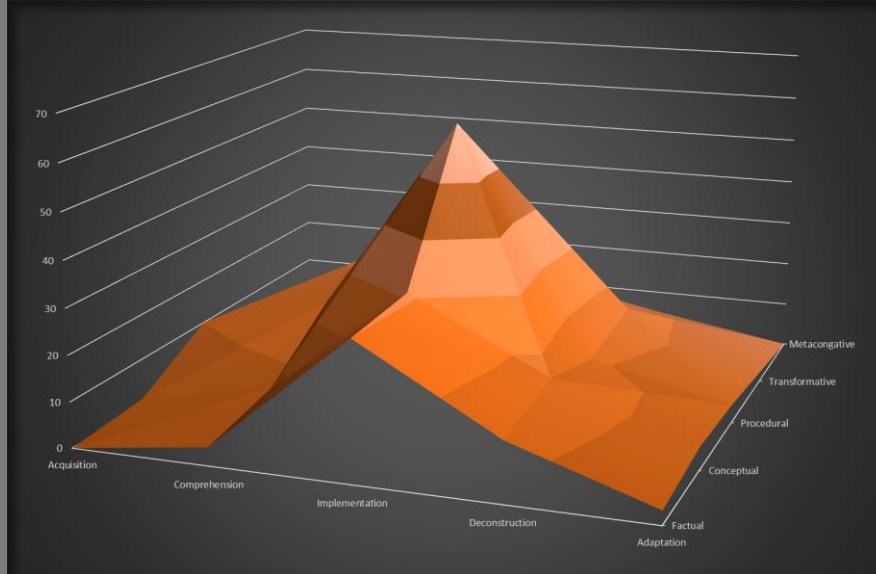
Metacognitive

Experienced User

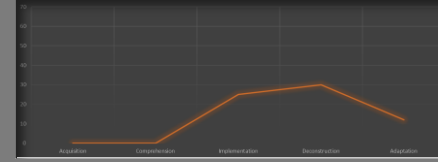
Cognition



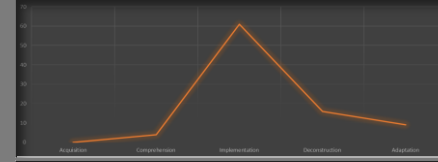
Cognitive Surface Map



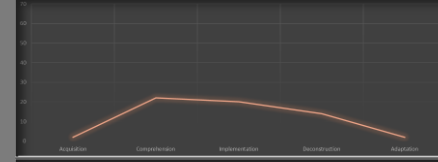
Factual



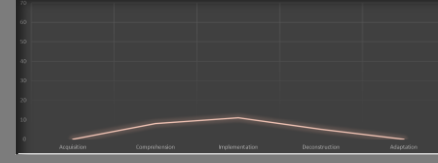
Conceptual



Procedural

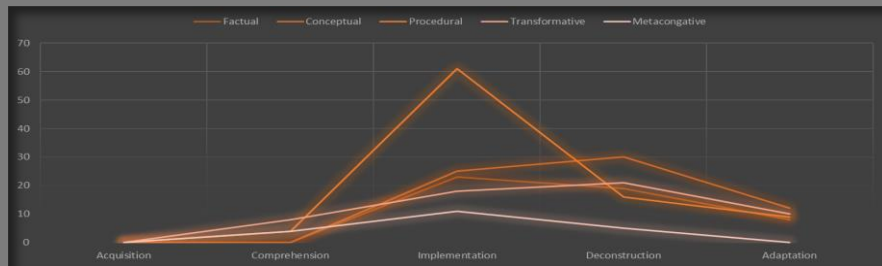


Transformative

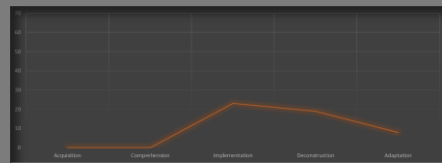
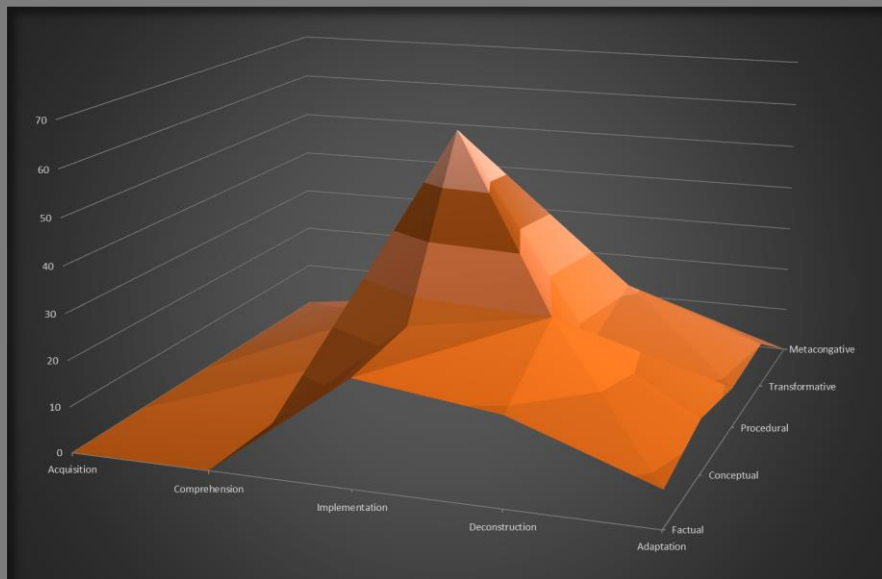


Metacognitive

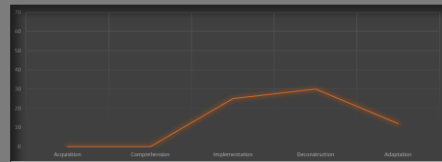
Cognition



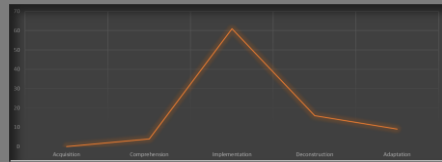
Cognitive Surface Map



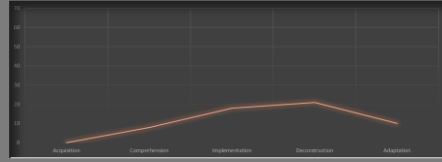
Factual



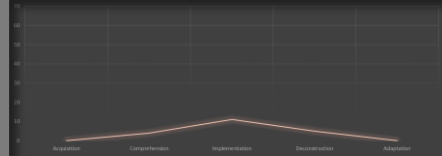
Conceptual



Procedural

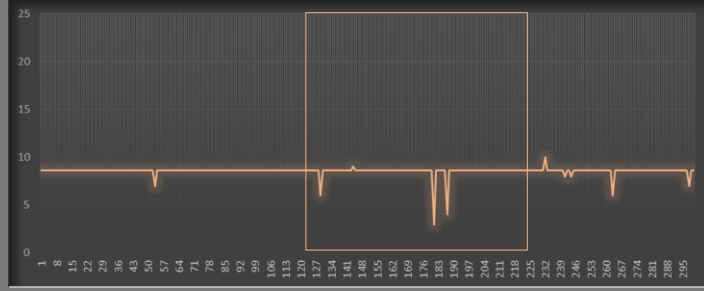


Transformative



Metacognitive

Major Troughs vs Average



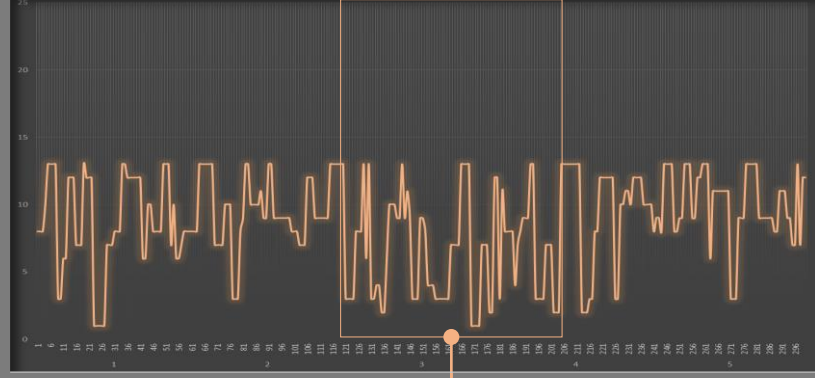
Major Peaks vs Average



Event Segment

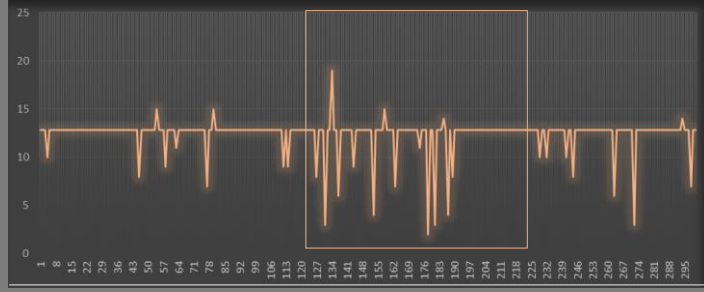


Expertise Trajectory

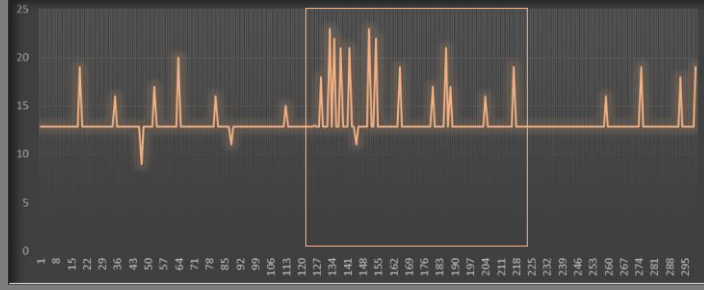


Experienced User

Major Troughs vs Average



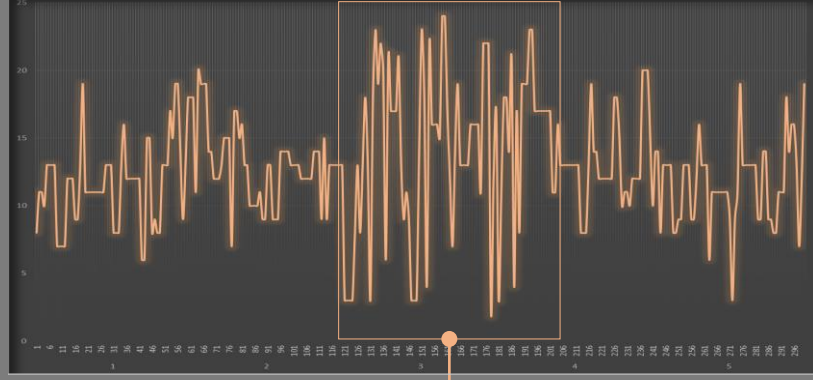
Major Peaks vs Average



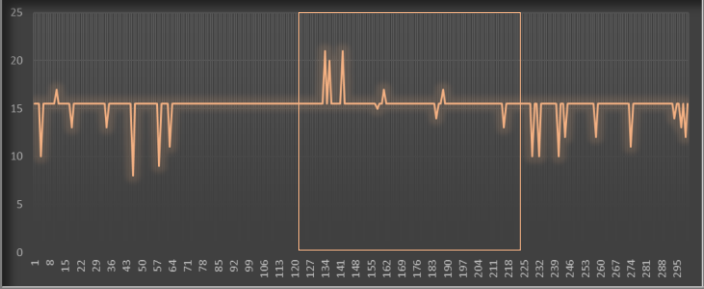
Event Segment



Expertise Trajectory



Major Troughs vs Average



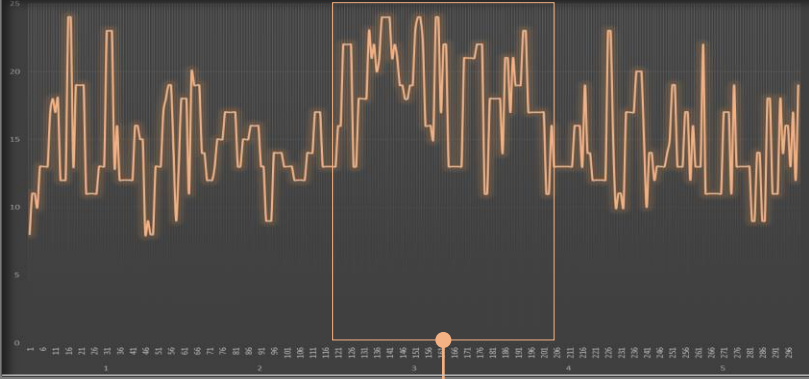
Major Peaks vs Average



Event Segment



Expertise Trajectory



Summary

Good working background of domain knowledge, but lacks in certain areas. Over-reliance on deliberate analysis and planning. Tackles issues in the order they are encountered, without being able to sufficiently prioritise importance and urgency. Demonstrates some level of panic and “freezing” behaviour in response to overwhelming situation.

Overall Performance

34

Working Background

Depth of
Understanding

Authoritative Mastery

Sorting and Prioritisation

35

Unable to Sort

Able to Sort

Rapid, Intuitive Sorting

Coping with Complexity

41

Analytical

Holistic

Intuitive

Emotional Regulation

27

Freezes

Relative Confidence

Remains Calm

Summary

Good working background of domain knowledge, excellent depth of understanding in certain areas. Some over-reliance on deliberate analysis and planning but demonstrates holistic grasp of complexity and displays confidence in decision making. Prioritises information in terms of hierarchical importance and urgency . Handles overwhelming situation with relative confidence, but some panic leads to overly deliberative behaviour.

Overall Performance

55

Working Background

Depth of
Understanding

Authoritative Mastery

Sorting and Prioritisation

60

Unable to Sort

Able to Sort

Rapid, Intuitive Sorting

Coping with Complexity

53

Analytical

Holistic

Intuitive

Emotional Regulation

54

Freezes

Relative Confidence

Remains Calm

Summary

Excellent depth of understanding of domain knowledge with some areas of deep intuitive understanding. Demonstrates deep holistic grasp of complexity, displays intuitive decision making and moves confidently between intuitive and analytical approaches with ease. Rapidly sorts information into relevant hierarchies. Handles overwhelming situation with relative confidence, despite the presence of many unknowns, remains emotionally regulated.



THANK YOU!

Whit Missildine, PhD
whit@viionworld.com



Christopher Clift
christopher.clift@babcockinternational.com

babcockTM