Managing Skill Decay in the Age of COVID

Mark Wiggins

EXPERTise 2.0
Expert Intensive Skills Evaluation Program

MACQUARIE University
SYDNEY AUSTRALIA

1

The Overall Challenge(s)

1. How do we establish cost-effectively, the rate and absolute decay in skilled performance amongst individual operators during 'lock-down'?
2. Can we intervene to forestall/prevent decays in skilled performance and how should that best occur?
3. Can we use our learning during COVID to inform future models of assessments of changes in skilled performance and associated interventions?

EXPERTise 2.0
Expert Intensive Skills Evaluation Program

MACQUARIE University
SYDNEY AUSTRALIA

2

Defining Skill Decay

Loss or decline in the quality of acquired knowledge/skills

- Non-Use
- Non-Practice

Human Performance Perspective

- Disease
- Ageing

Pathology Perspective

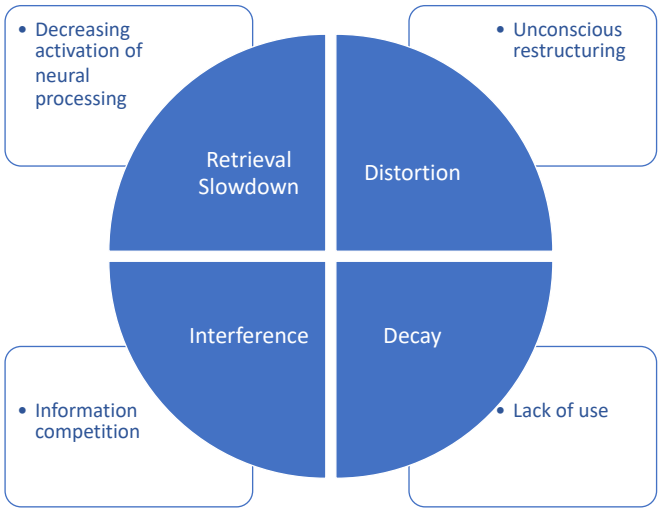
Arthur, W., Jr., & Day, E. A. (2020). Skill decay: The science and practice of mitigating skill loss and enhancing retention. In P. Ward, J. M. Schraagen, J. Gore, & E. Roth (Eds.), *The Oxford handbook of expertise* (pp. 1085–1108). Oxford University Press.

EXPERTise 2.0 Expert Intensive Skills Evaluation Program

MACQUARIE University SYDNEY AUSTRALIA

3

Explanations of Skill Decay



Ecke, P. (2004). Language attrition and theories of forgetting: A cross-disciplinary review. *International journal of bilingualism*, *8*(3), 321-354.

EXPERTise 2.0 Expert Intensive Skills Evaluation Program

MACQUARIE University SYDNEY AUSTRALIA

4

‘Interest’ in Skill Decay

Aviation

Introduction of Automation → Recognition of the Potential for Skill Decay → Organisational/ Regulatory Strategies to Manage Skill Decay

Organisational/ Regulatory Strategies to Manage Skill Decay → Recurrent Check and Training (Outcome-Based Approaches) → High Fidelity Simulation

EXPERTise 2.0 Expert Intensive Skills Evaluation Program

Arthur Jr, W., Bennett Jr, W., Stanush, P. L., & McNelly, T. L. (1998). Factors that influence skill decay and retention: A quantitative review and analysis. *Human performance*, *11*(1), 57-101.

MACQUARIE University SYDNEY AUSTRALIA

5

The Problem of Skill Decay (more broadly)

Difficult to establish precisely, the impact of skill decay on human performance

- Conflated with other human performance issues (e.g. anxiety, team processes)
- Masked by systemic issues (e.g. organisational culture, climate, processes, leadership)
- Decay can be gradual, with performance supported by adaptive processes

In the absence of ongoing evaluation, have skills degraded or were they never acquired to the level anticipated/necessary to sustain performance?

EXPERTise 2.0 Expert Intensive Skills Evaluation Program

MACQUARIE University SYDNEY AUSTRALIA

6

Outcome of Skill Decay?

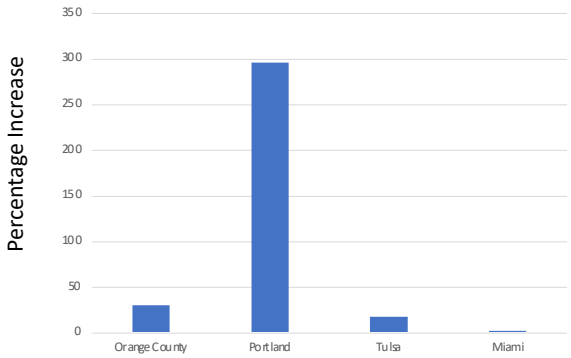
Spike in cycling accidents during Sydney lockdown as more people took to two wheels

Public health expert urges city to maintain pedal-powered health benefits as benefits outweigh injury risk

Get our free news app; get our morning email briefing

Cyclists ride along the quiet walkway under Sydney's harbour bridge during lockdown. The pandemic caused a surge in cycling among Sydney residents. Photograph: Saeed Khan/AFP/Getty Images

NSW Health - From 26 June, when Sydney's lockdown began, to 14 October, bicycle-related injuries increased by 78% compared to the same period last year.



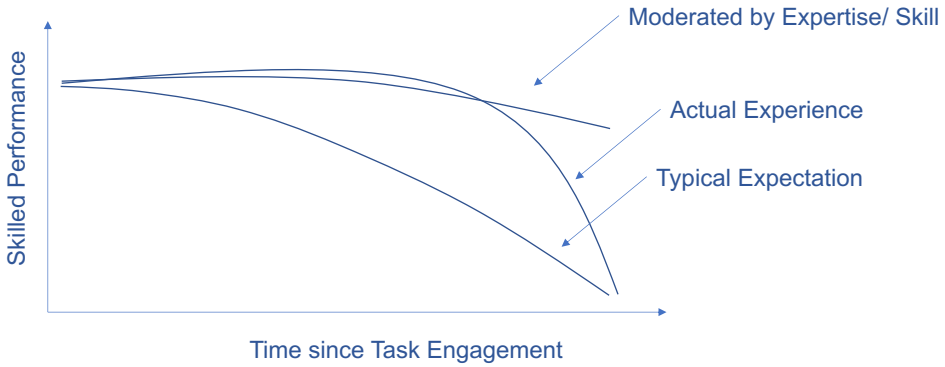
Alaniz L, et al. The Effect of Coronavirus Shutdowns on Nationwide Trauma Patterns. *Scientific Forum Presentation*. American College of Surgeons Clinical Congress. 2021.

EXPERTise 2.0 Expert Intensive Skills Evaluation Program

MACQUARIE University SYDNEY AUSTRALIA

7

Differences in Skill Decay



Vlasblom, J. I., Pennings, H. J., van der Pal, J., & Oprins, E. A. (2020). Competence retention in safety-critical professions: a systematic literature review. *Educational Research Review*, *30*, 100330.

EXPERTise 2.0 Expert Intensive Skills Evaluation Program

MACQUARIE University SYDNEY AUSTRALIA

8

Are Assessments of Skill Decay Necessary?

Probably Unnecessary

Continuous (regular) process of outcome-based assessment using task-appropriate tools

Assessments are comprehensive and examine a range of skills and capabilities

Assessments are valid, reliable, and sensitive

Data are comprehensive, retained and examined on a regular basis to identify changes in performance

EXPERTise 2.0 Expert Intensive Skills Evaluation Program

MACQUARIE University SYDNEY AUSTRALIA

9

'Outcome' Measures of Skill Decay

Context: Simulated general aviation flight from Taree to Coffs Harbour with an engine failure parallel to Port Macquarie

Flight planned at 7,500 ft

Port Macquarie

Winds Aloft 230° 21kts

EXPERTise 2.0 Expert Intensive Skills Evaluation Program

MACQUARIE University SYDNEY AUSTRALIA

10

Performance Outcomes

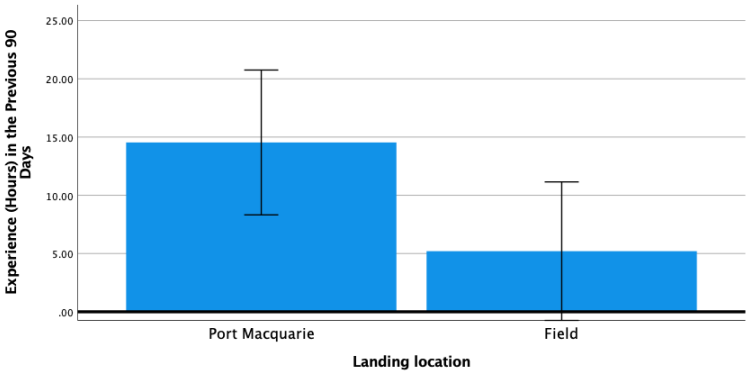
Participants: 23 GA Pilots

Mean Experience

Total Hours: 171

Port Macquarie: 11

Field: 12

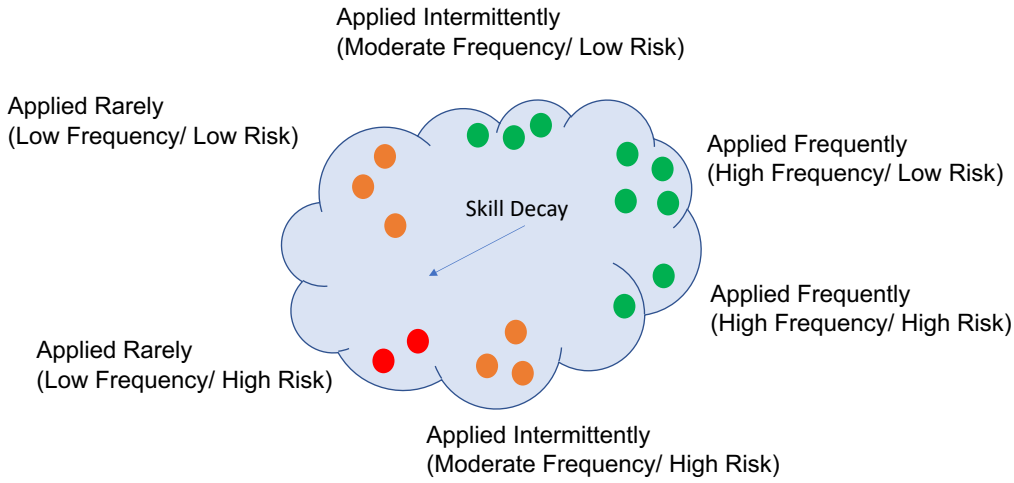


EXPERTise 2.0 Expert Intensive Skills Evaluation Program

MACQUARIE University SYDNEY AUSTRALIA

11

Skill Decay as a 'Resident Pathogen'



EXPERTise 2.0 Expert Intensive Skills Evaluation Program

MACQUARIE University SYDNEY AUSTRALIA

12

EASA Hazard Identification (Post COVID)

EXPERTise 2.0 Expert Intensive Skills Evaluation Program

MACQUARIE University SYDNEY AUSTRALIA

13

Psychological Implications of Skill Decay

Awareness of Skill Decay

- Avoidance
- Anxiety
- Depression
- Loss of Confidence
- Confusion
- Loss of Face

→ Admitting that skills may have decayed with implications for employment and/or reputation

→ Knowing how to address skill decay

→ Accessing resources to manage skill decay

Pre-COVID – Tended to be associated with ageing → More evident across a broader population (skill recovery)

EXPERTise 2.0 Expert Intensive Skills Evaluation Program

MACQUARIE University SYDNEY AUSTRALIA

14

Evaluating Skilled Performance during 'Lockdown'

Electrical Control

- Highly skilled operators
- Extensive experience
- High-consequence environment
- Variable periods of non-activity

Pool Lifeguarding

- Less skilled operators
- Less experience
- High-consequence environment
- Extended periods of non-activity

EXPERTise 2.0 Expert Intensive Skills Evaluation Program

MACQUARIE University SYDNEY AUSTRALIA

15

Critical Skills

Situational Assessment
- The capacity to identify and make sense of changes in the system state by deriving relations among entities (Blasch et et al., 2006)

Sustained Attention
- The capacity to maintain response persistence and continuous effort over extended periods of time (Ko, et al., 2017)

Prospective Memory
- The capacity to remember to carry out intended actions in the future (Kern, 2000)

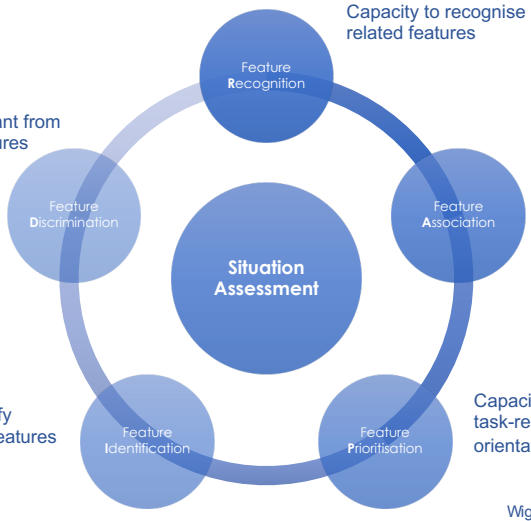
Communication
- The capacity to interpret semantic and prosodic communication strategies rapidly and accurately (Auton et al., 2013)

EXPERTise 2.0 Expert Intensive Skills Evaluation Program

MACQUARIE University SYDNEY AUSTRALIA

16

Situation Assessment (R-A-P-I-D)



Capacity to recognise patterns of task-related features

Capacity to quickly draw associations between task-related features

Capacity to prioritise the acquisition of task-related features during problem-orientation

Capacity to quickly identify changes in task-related features

Capacity to discriminate relevant from less relevant task-related features during initial actions

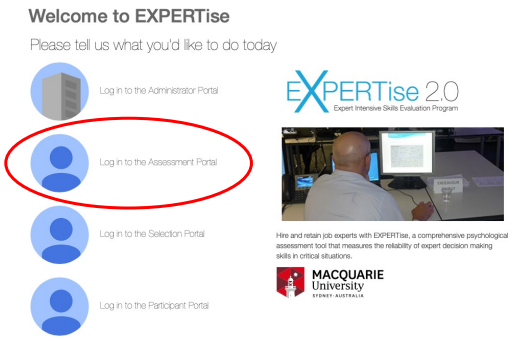
EXPERTise 2.0 Expert Intensive Skills Evaluation Program

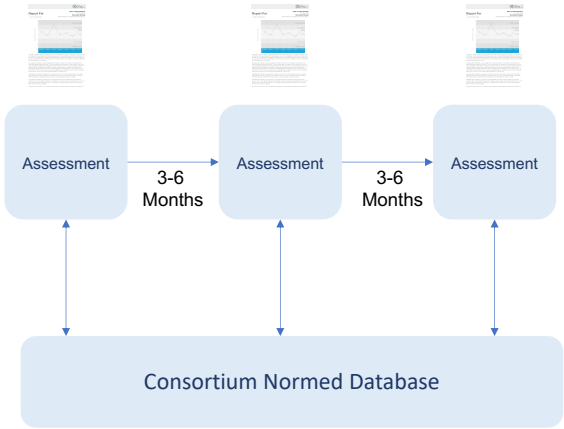
Wiggins, M. W. (2021). A behaviour-based approach to the assessment of cue utilisation: implications for situation assessment and performance. *Theoretical Issues in Ergonomics Science*, *22*(1), 46-62.

MACQUARIE University SYDNEY AUSTRALIA

17

EXPERTise 2.0





EXPERTise 2.0 Expert Intensive Skills Evaluation Program

MACQUARIE University SYDNEY AUSTRALIA

18

EXPERTise 2.0 (Validity, Reliability, Norms)

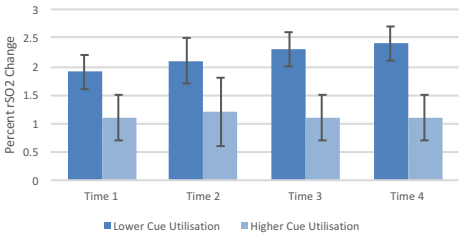
Test-Retest Reliability

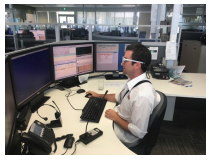
	Cronbach's Alpha	*n*
Feature Recognition Task	0.667	24
Feature Association Task	0.773	24
Feature Prioritization Task	0.754	24
Feature Identification Task	0.782	24
Feature Discrimination Task	0.795	23

Norms

320 network operators from 11 Distributed Network Service Providers

Construct Validity





EXPERTise 2.0 Expert Intensive Skills Evaluation Program

MACQUARIE University SYDNEY AUSTRALIA

19

EXPERTise 2.0 (Electricity DNSP Edition)

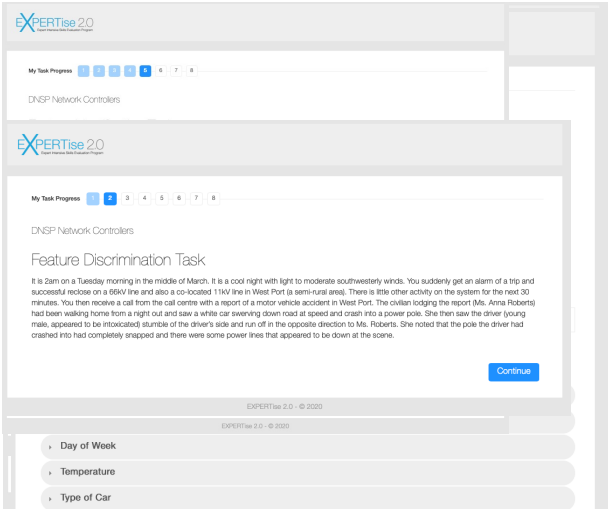
Feature Recognition Task

Feature Association Task

Feature Prioritisation Task

Feature Identification Task

Feature Discrimination Task



EXPERTise 2.0 Expert Intensive Skills Evaluation Program

MACQUARIE University SYDNEY AUSTRALIA

20

EXPERTise 2.0 (Pool Lifeguard Edition)

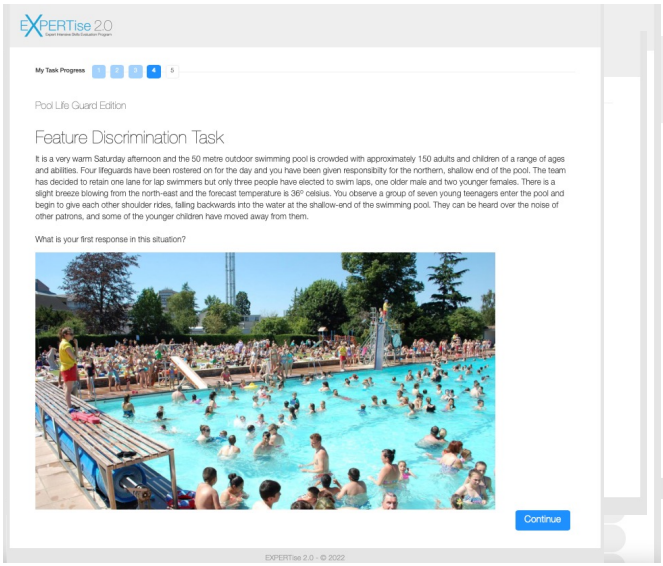
Feature Recognition Task

Feature Association Task

Feature Prioritisation Task

Feature Identification Task

Feature Discrimination Task

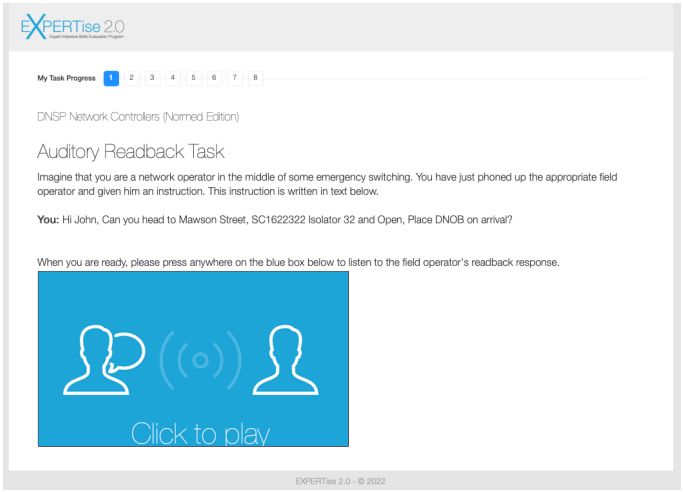


EXPERTise 2.0
Expert Intensive Skills Evaluation Program

MACQUARIE University
SYDNEY AUSTRALIA

21

EXPERTise 2.0 (Communication)



EXPERTise 2.0
Expert Intensive Skills Evaluation Program

MACQUARIE University
SYDNEY AUSTRALIA

22

Reports (Detailed) – Norm Referenced against 'Industry'

Phase 1

EXPERTise 2.0

Report For

Date of Administration

Normative Sample
DNSP Network Controllers (Normed Edition),

Candidate's response latency in locating failures in his environment was typical or average as compared to the norm group. This may indicate that he recognises key cues in the operational environment at a level typical of

EXPERTise 2.0
Expert Intensive Skills Evaluation Program

MACQUARIE University

23

Reports (Detailed) – Norm Referenced against 'Industry'

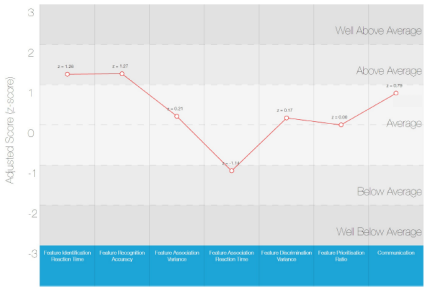
Phase 2

EXPERTise 2.0

Report For

Date of Administration

Normative Sample
DNSP Network Controllers (Normed Edition),



As compared to the norm group, Candidate demonstrated above average performance in terms of response latency when locating failures in his environment. This may indicate that he is faster to recognise key cues in the

Intervention

Phase 3

EXPERTise 2.0

Report For

Date of Administration

Normative Sample
DNSP Network Controllers (Normed Edition),

Candidate's response latency in locating failures in his environment was typical or average as compared to the norm group. This may indicate that he recognises key cues in the operational environment at a level typical of

EXPERTise 2.0
Expert Intensive Skills Evaluation Program

MACQUARIE University

24

Interventions

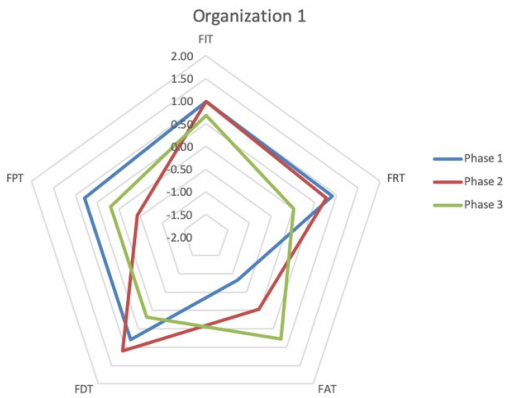
RAPID Task	Intervention Activities (Exposure to, Explanation of, and Practice…)
Feature **R**ecognition	Classifying changes in the system state (e.g. low voltage, low frequency, isolation)
Feature **A**ssociation	Isolating feature-event dependencies following changes in the system state (e.g. temporal, structural, organisational)
Feature **P**rioritisation	Sequencing the order of importance of features in responding to changes in the system state (e.g. de-energisation prior to isolation)
Feature **I**dentification	Directing attention towards critical features quickly and accurately following changes in the system state (e.g. loss of supply)
Feature **D**iscrimination	Contrasting features based on their relevance to changes in the system state (e.g. field report against an alarm)

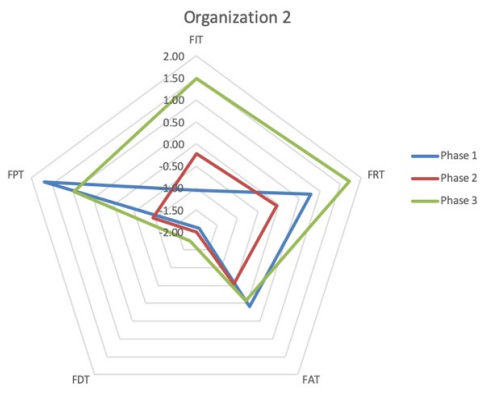
EXPERTise 2.0 Expert Intensive Skills Evaluation Program

MACQUARIE University SYDNEY AUSTRALIA

25

Organisational Comparisons (Norm Referenced)





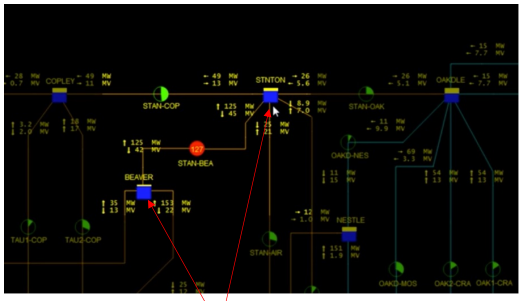
EXPERTise 2.0 Expert Intensive Skills Evaluation Program

MACQUARIE University SYDNEY AUSTRALIA

26

Interventions – Electricity Control

Designed 'Targeted' Online Training using PowerSimulator (INCSYS)



(Feature Association)
Isolating feature dependencies (What could be causing that?)

- Online
- Capable of simulating Australian Networks
- Feedback

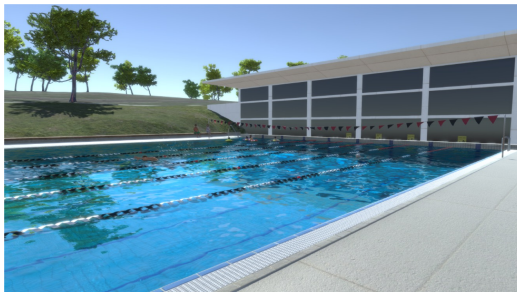
Note that the dependencies have been highlighted

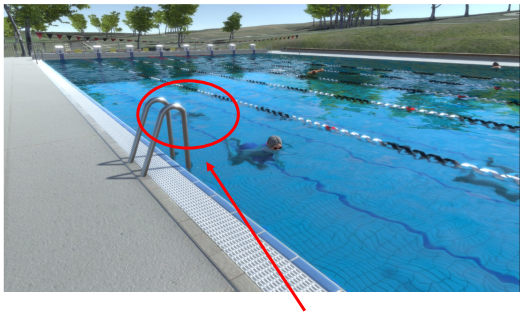
EXPERTise 2.0
Expert Intensive Skills Evaluation Program

MACQUARIE University
SYDNEY AUSTRALIA

27

Interventions – Pool Lifeguards





Virtual Reality Training

- Portable
- Incorporates Feedback
- Cost-effective
- Construct Validity

(Feature Identification)
Directing attention towards critical features quickly and accurately following changes in the system state

EXPERTise 2.0
Expert Intensive Skills Evaluation Program

MACQUARIE University
SYDNEY AUSTRALIA

28

Learning Outcomes

Preparation

- Organisation Culture (Learning, Trust, Maturity)
- Training and Development Systems that Augment Assessment
- Management Support for Development
- Establish Organisational and Industry Norms
- Normalise the Process of Self-Improvement/ Mastery

Administration

- Ethical Issues (Organisational Involvement)
- Underestimation of the time/ effort required
- Individualisation of Interventions
- Communication and Involvement of 'Human Resources'
- Ideally, the reports are the basis for a discussion

EXPERTise 2.0 Expert Intensive Skills Evaluation Program

MACQUARIE University SYDNEY AUSTRALIA

29

Implications

Cost-effective strategies for on-going assessment and intervention to manage skill decay in the future

- Automated vehicles
- Professions with less access to high fidelity simulation

Ageing

- Managing skill decay in an ageing population
- Job crafting to manage the implications of skill decay (Adaptive Systems)

EXPERTise 2.0 Expert Intensive Skills Evaluation Program

MACQUARIE University SYDNEY AUSTRALIA

30

Thank you

- Dr Jaime Auton
- Dr Daniel Sturman
- Dr Thom Loveday
- Meredith Porte
- Energy Queensland
- Essential Energy
- Powercor
- SA Powernetworks
- Ausnet Services
- YMCA
- Thomson Bridge

EXPERTise 2.0
Expert Intensive Skills Evaluation Program

MACQUARIE University
SYDNEY·AUSTRALIA

31