Implications for Physical Employment Standards (PES)

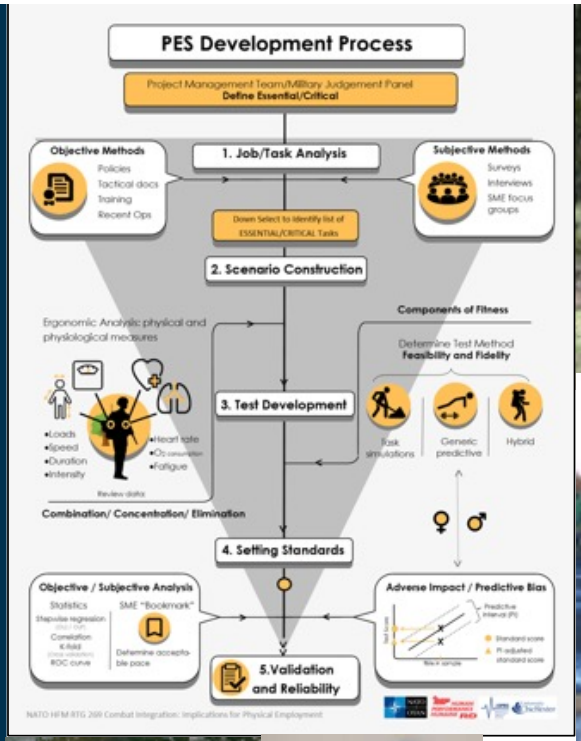
The 33rd Finnish Exercise Testing Symposium,
Helsinki Finland, March 29-30, 2023
Main theme: Fitness Testing in Tactical Occupations

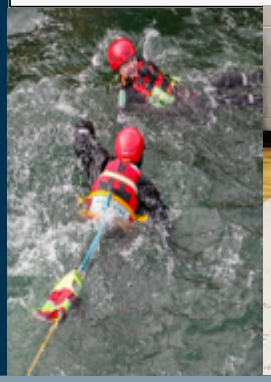
Professor Sam Blacker (PhD)

Occupational Performance Research Group

Institute of Sport Nursing and Allied Health

University of Chichester





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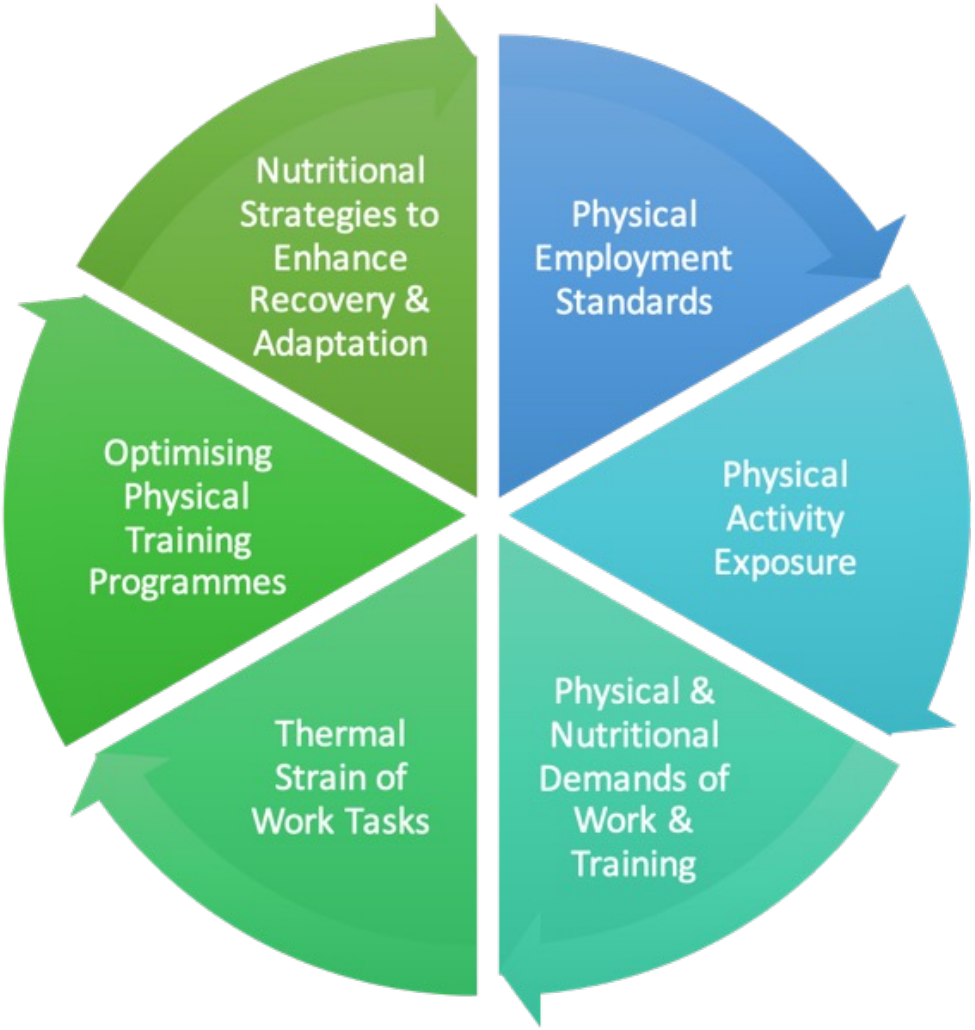


NATO HFM-269 Panel - Combat Integration: Implications for Physical Employment Standards

Meeting no	Date	Location
1	7-9 June 2016	Paris (FRA)
2	26-28 Oct 2016	Ottawa (CAN)
3	24-26 Apr 2017	Sandhurst (UK)
4	4-6 Dec 2017	Melbourne (AUS)
5	12-13 Jul-2018	Gosport (UK)
6	29-30 Jan 2019	West Point (USA)

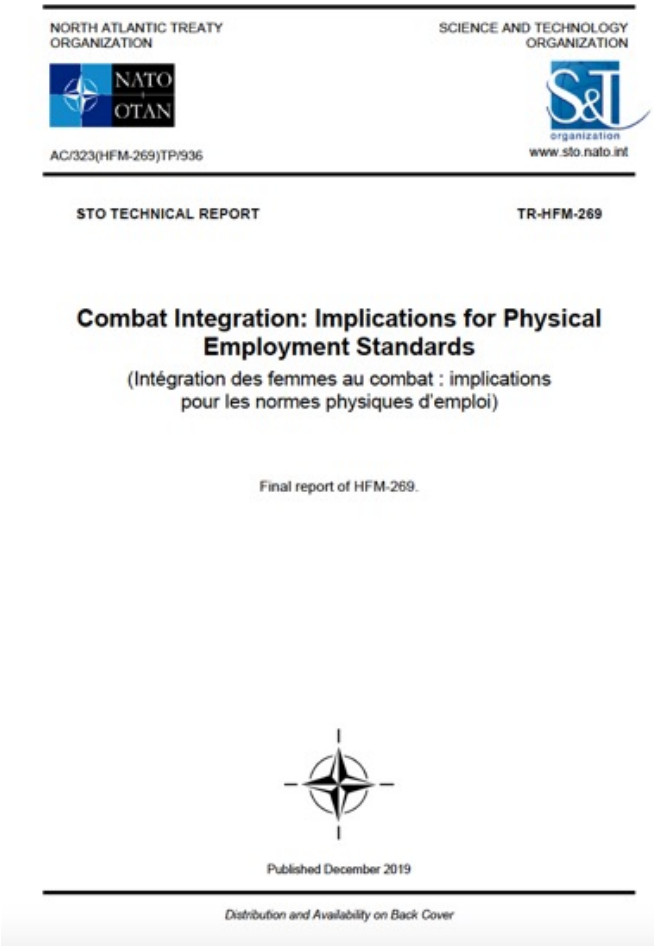
HFM-269 Membership List

CHAIR

MEMBERS

ADDITIONAL CONTRIBUTORS

PANEL/GROUP MENTOR



NORTH ATLANTIC TREATY ORGANIZATION

SCIENCE AND TECHNOLOGY ORGANIZATION

AC/323(HFM-269)TP/936

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STO TECHNICAL REPORT

TR-HFM-269

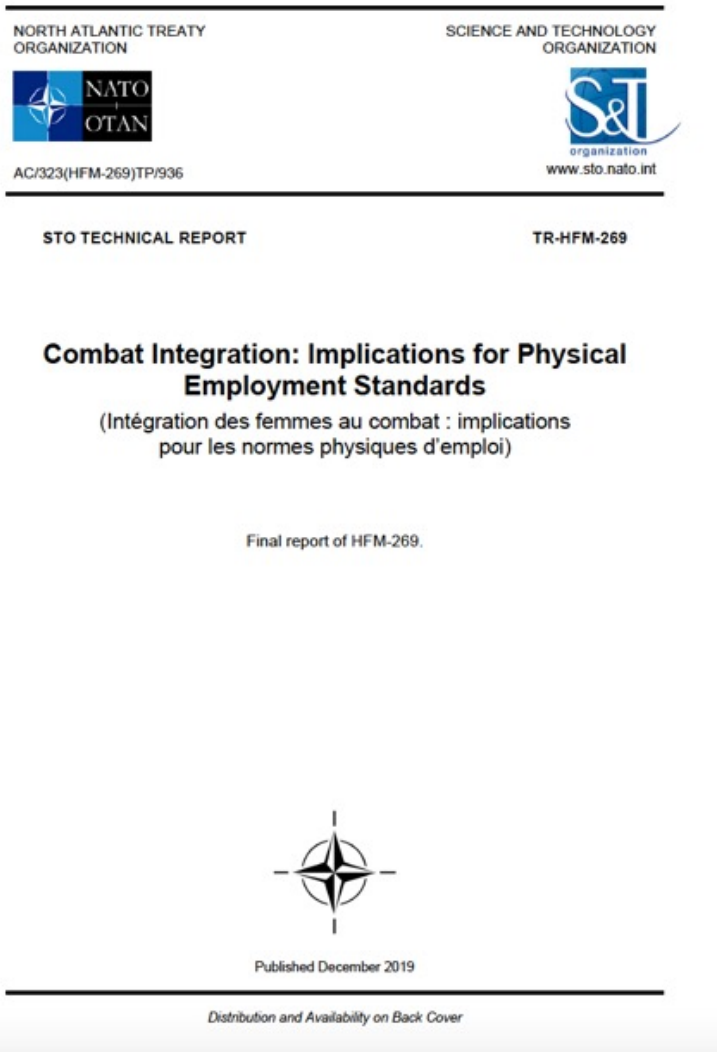
Combat Integration: Implications for Physical Employment Standards

(Intégration des femmes au combat : implications pour les normes physiques d'emploi)

Final report of HFM-269.

Published December 2019

Distribution and Availability on Back Cover



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"Physical Employment Standards (PES) are physical fitness tests that are derived from the job-role that an individual performs."

"As such, when the physical requirements of a job-role are the same for all personnel, then the PES related to these roles should be the same irrespective of a person's sex, race or age."

"PES are used both at the point of selection and a routine in-service fitness tests."

FIT TO FIGHT
THE NEW ROLE FITNESS TEST ENTRY

WHAT IS PES

PES ensures the physical ability of Army personnel aligns to the physical requirements of their role. PES testing will be role-related, reflecting the essential, most physically demanding tasks required to perform the specific role successfully. PES standards reflect the acceptable physical standards required to safely and satisfactorily complete these essential tasks.

WHAT IS RFT ENTRY (E)

Role Fitness Test (Entry) (RFT(E)). Will be used as the selection standard to confirm that potential soldiers/officer cadets are at the appropriate level of fitness to commence Basic Training. RFT (E) will consist of: Seated Med Ball Throw, Mid Thigh Pull and a 2 km Run.

1: SEATED MED BALL THROW

A seated weighted throw with a 4kg Med Ball. To measure **explosive upper body strength**.

2: MID THIGH PULL

A basic deadlift using a mid thigh pull machine. To assess **lower limb strength**.

3: 2 KM RUN

A 2km best effort run following a group warm-up. To assess **aerobic capacity**.

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ARMY BE THE BEST

FIT TO FIGHT
THE NEW GCC PHYSICAL EMPLOYMENT STANDARDS

WHAT IS GCC-PES

Ground Close Combat (GCC) Physical Employment Standards (PES) ensure the physical ability of Army personnel aligns to the physical requirement of the role. PES standards reflect the acceptable physical standards to safely and satisfactorily complete essential tasks.

WHAT IS RFT(S)

Role Fitness Test Soldier (RFT(S)) replaces the current AFT to become the in-Service test. RFT(S) testing will be role-related, gender and age free, reflecting the essential, most physically demanding task required to perform the specific role successfully - RFT(S) Consists of the following.

ROLE FITNESS TEST (SOLDIER) (ANNUALLY) 1 TO 6

1: LOADED MARCH

Infantry/RAC:
4km tab with **40kg** within **50 mins** followed by a further **2km** with **25kg** in **15 mins**

16AAB/Para:
4km tab with **40kg** within **35mins** followed by a further **2km** with **25kg** in **12 mins 30 secs**

2: FIRE & MOVEMENT

Twenty **7.5m** tactical bounds controlled by a PTI, followed by a **15m** crawl and **15m** sprint in **55 secs**

3: CASUALTY DRAG

110kg bag pulled over **20m** in **35 secs**

4: WATER CAN CARRY

Simulates moving with a stretcher. Carry two **22kg** cans over **240m** in **4 mins**

5: VEHICLE CASEVAC

70kg lift, hold for **3 secs**

6: REPEATED LIFT & CARRY

Shifting bags weighing **20kg** **20** times over a **30m** distance in **14 mins**

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UPDATE 3 OF 4

FIT TO FIGHT
THE NEW ANNUAL PHYSICAL TEST FOR NON-GROUND CLOSE COMBAT (NON-GCC) PERSONNEL *(ANNEX A)

Listed below are the agreed Regular and Reserve tests and standards that will apply to all cap badge and employment roles

Role Groups	Loaded Carry Stage 1	Loaded Carry Stage 2	Tactical Movement	Casualty Drag	Stretcher Carry	Vertical Lift	Repeated Carry		Incremental Lift-1m	Incremental Lift-Shoulder	Incremental Lift-Overhead
							RFT group	no shuttles required			
RAFFC							Medium	32 (16 items)	35 kg	35 kg	25 kg
RE-1 (25 Op, 23 Engr Regt, 24 Engr Regt, 35SIGE	4 km - 50 mins - 40 kg	2 km - 15 mins - 25 kg	90m - 15m (crawl/sprint) - 20x	15m - 35m	240m - 240m	40kg	Heavy	28 (14 items)	35 kg	35 kg	25 kg
RA-1 (Spec Obs, FST, J Tac, OPA)							Heavy	28 (14 items)	35 kg	35 kg	25 kg
SASC							Medium	32 (16 items)	30 kg	30 kg	20 kg
RE-2 (All other)	4 km - 50 mins - 35 kg	2 km - 16 mins - 21 kg	90m - 15m (crawl/sprint) - 20x	15m - 40m			Heavy	28 (14 items)	35 kg	35 kg	25 kg
AMIS-CH							Medium	32 (16 items)	30 kg	25 kg	20 kg
RA-1 (All other)							Heavy	28 (14 items)	35 kg	25 kg	20 kg
REME							Heavy	28 (14 items)	35 kg	35 kg	25 kg
AMIS-1 (CWT, Paramedic, MSO, RMO)							Heavy	28 (14 items)	25 kg	25 kg	20 kg
RMP							Medium	32 (16 items)	35 kg	25 kg	15 kg
Rifleguls							Heavy	28 (14 items)	30 kg	30 kg	25 kg
RLC							Medium	32 (16 items)	30 kg	25 kg	20 kg
INT CORPS							Medium	32 (16 items)	25 kg	25 kg	15 kg
AAC-GC	2 km - 35 mins - 35 kg	2 km - 17 mins - 31 kg	90m - 15m (crawl/sprint) - 20x	15m - 40m	120m - 120m	40kg	Medium	32 (16 items)	30 kg	30 kg	20 kg
AAC-AC							Medium	32 (16 items)	30 kg	30 kg	20 kg
AMIS-2 (All other)							Medium	32 (16 items)	25 kg	25 kg	20 kg
AOC-(LWKS, ETS, MANLA), SPG							Medium	32 (16 items)	25 kg	25 kg	15 kg
AOC-ALG							Medium	32 (16 items)	25 kg	25 kg	15 kg
MPS							Medium	32 (16 items)	25 kg	25 kg	15 kg
CAMUS	2 km - 25 mins - 21 kg	1 km - 8 mins - 12 kg	30m - 15m (crawl/sprint) - 20x	10m - 40m			Medium	32 (16 items)	30 kg	25 kg	20 kg
MPGS							Medium	32 (16 items)	15 kg	15 kg	15 kg
RACMD	2 km - 25 mins - 14 kg	1 km - 8 mins - 6 kg					Medium	32 (16 items)	15 kg	15 kg	15 kg
OSC	2 km - 25 mins - 35 kg	2 km - 17 mins - 31 kg	90m - 15m (crawl/sprint) - 20x	15m - 40m			N/A		N/A	N/A	N/A

Tests, standards and protocols will be published in MATT 2 prior to implementation in Apr 21

ARMY BE THE BEST

Occupational Medicine 2016;**66**:38–45
Advance Access publication 1 October 2015 doi:10.1093/occmed/kqv122

Physical employment standards for UK fire and rescue service personnel

S. D. Blacker[1,2], M. P. Rayson[1,3], D. M. Wilkinson[1,2,†], J. M. Carter[1,4], A. M. Nevill[5] and V. L. Richmond[1,6]

Rural Fire
50 m Shuttles
Hose Reel, Hoses & Pump

Domestic Fire
30 kg & 55 kg Casualty, 3 x 10m

Enclosed Space
80 m³, 8 Obstacles

Ladder Climb
Ascend 13.5 m
Alight then descend

Ladder Lift
75 cm – 182 cm
From 20 kg-5 kg
Increments

Ladder Extension
fully extend a 13.5 metre pitched ladder and lower under control

Pump Assembly
Assemble & dissemble following diagrams

Communities and Local Government

National Firefighter Selection Process
Development and Validation of National Firefighter Selection Tests: Physical Tests

National Ambulance Resilience Unit

NARU

Work xx (20xx) x–xx
DOI:10.3233/WOR-192960
IOS Press

A job task analysis to describe the physical demands of specialist paramedic roles in the National Ambulance Resilience Unit (NARU)

Carla A. Rue[a], Mark P. Rayson[b], Ella F. Walker[a], Julianne Doherty[a], Jane Thompson[a], Stephen D. Myers[a] and Sam D. Blacker[a,*]
[a]*University of Chichester, Chichester, UK*
[b]*Mark Rayson Consulting Ltd, Bristol, UK*

Received 01 April 2019
Accepted 01 April 2019

thor Proof

Applied Ergonomics 95 (2021) 103460

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Applied Ergonomics

journal homepage: www.elsevier.com/locate/apergo

Development of physical employment standards of specialist paramedic roles in the National Ambulance Resilience Unit (Naru)

Andrew G. Siddall[a,*], Mark P. Rayson[b], Ella F. Walker[a], Julianne Doherty[a], Josh I. Osofa[a], Tessa R. Flood[a], Beverley Hale[a], Steve D. Myers[a], Sam D. Blacker[a]

[a] *Occupational Performance Research Group, University of Chichester, UK*
[b] *Mark Rayson Consulting Ltd, Bristol, UK*

ACSM Annual Meeting
31 May – 04 June 2016
Boston, USA

Development of an Aerobic Fitness Standard for Telecommunication Mast Climbers

Sam D. Blacker [1], Andrew T. West [1], Nicola Cordell [2], David M. Wilkinson [1†]

[1] University of Chichester, Chichester UK; [2] Corporate Health Limited, UK; [†]Deceased 18 April 2015

University of Chichester
Occupational Performance Research Group

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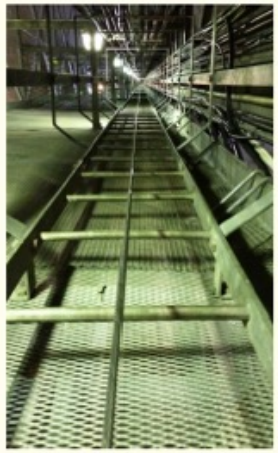
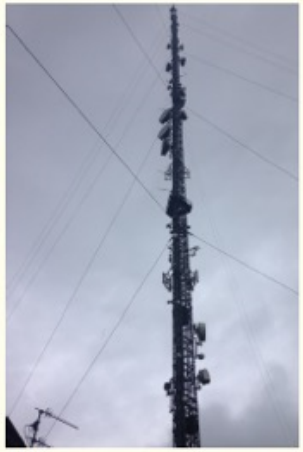
Participants wearing climbing ensemble and instrumented with monitoring devices



Emley Moor Mast – Phase 1 data collection location



Stockland Hill Mast – Phase 2 data collection location

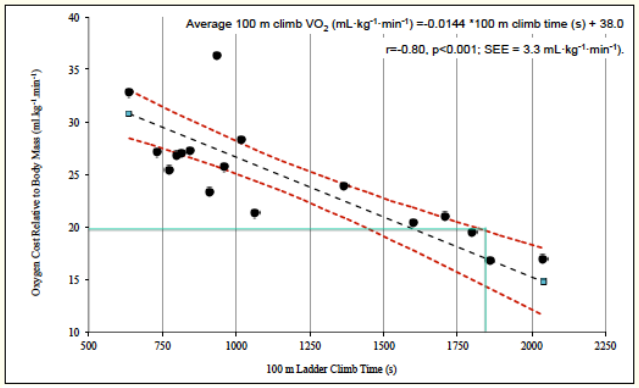
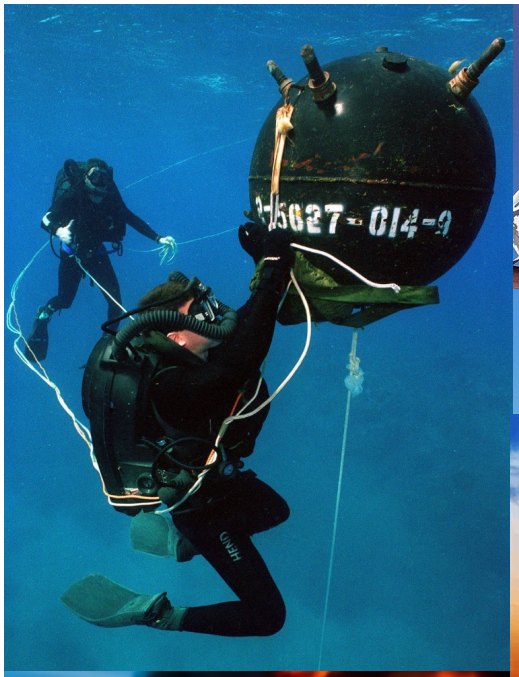
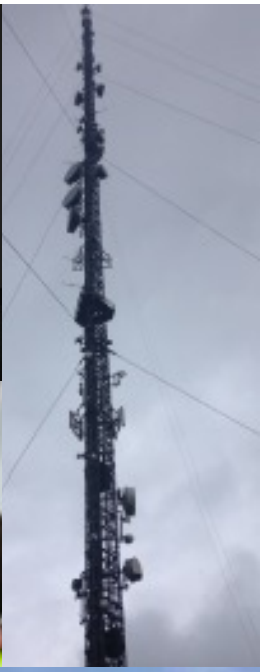


Figure 1 - The relationship between average VO_2 during climbing and 100 m climb time for climbers in both Phase 1 and Phase 2.

Adopting a common age-free and gender free job-related minimum aerobic fitness standard of ≥ 27 mL·kg^{-1}·min^{-1} will ensure that the fitness standard conforms to equality legislation.

Climbers aerobic fitness is currently measured using a Chester Step Test which requires a mean VO_2max of 28 mL·kg^{-1}·min^{-1} to complete Level 4 [2]. Therefore, climbers should complete Level 4 on the Chester Step Test to to meet the related minimum aerobic fitness standard for safe and effective climbing performance.





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Benefits of PES

- ✓Assurance of the the minimum role-related physical capability of all individuals in an organisation.
- ✓Evidence-base for legal defensibility.
- ✓Matching of the physical capability of personnel to the demands of the job, which will mitigate injury risk.
- ✓Cost saving to organisation and worker (health & financial)
- ✓A framework for physical training and interventions to maximise individuals role-related physical capability.

Legal Defensibility

UK Employment Law Example: Equality Act 2010

Protected Characteristics *- **Sex**, **Age**, Disability, Gender reassignment, Race, Religion or belief, Sexual orientation, Marriage and civil partnership, Pregnancy and maternity.*

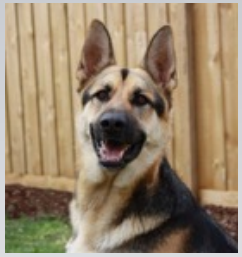
Direct Discrimination

Different standards for men and women, or younger and older people

Cannot be justified in Law

Allcock v Chief Constable, Hampshire Constabulary (1997)

Dog handler
2 mile multi-terrain run
Pass Standard
Men 16 min,
Women 17 min



Indirect Discrimination

Same standards for men and women, or younger and older people

Can be justified in Law IF

Test and pass standard must reflects the physical requirements of the job

Bamber v Greater Manchester Police (2010)

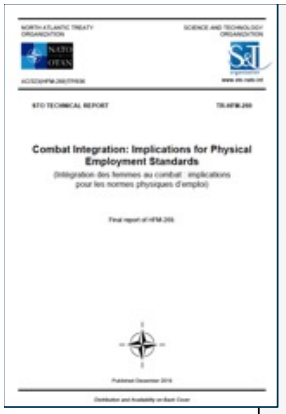
Evidence based "job related" physical test(s)
Evidence based "job related" pass standard(s)

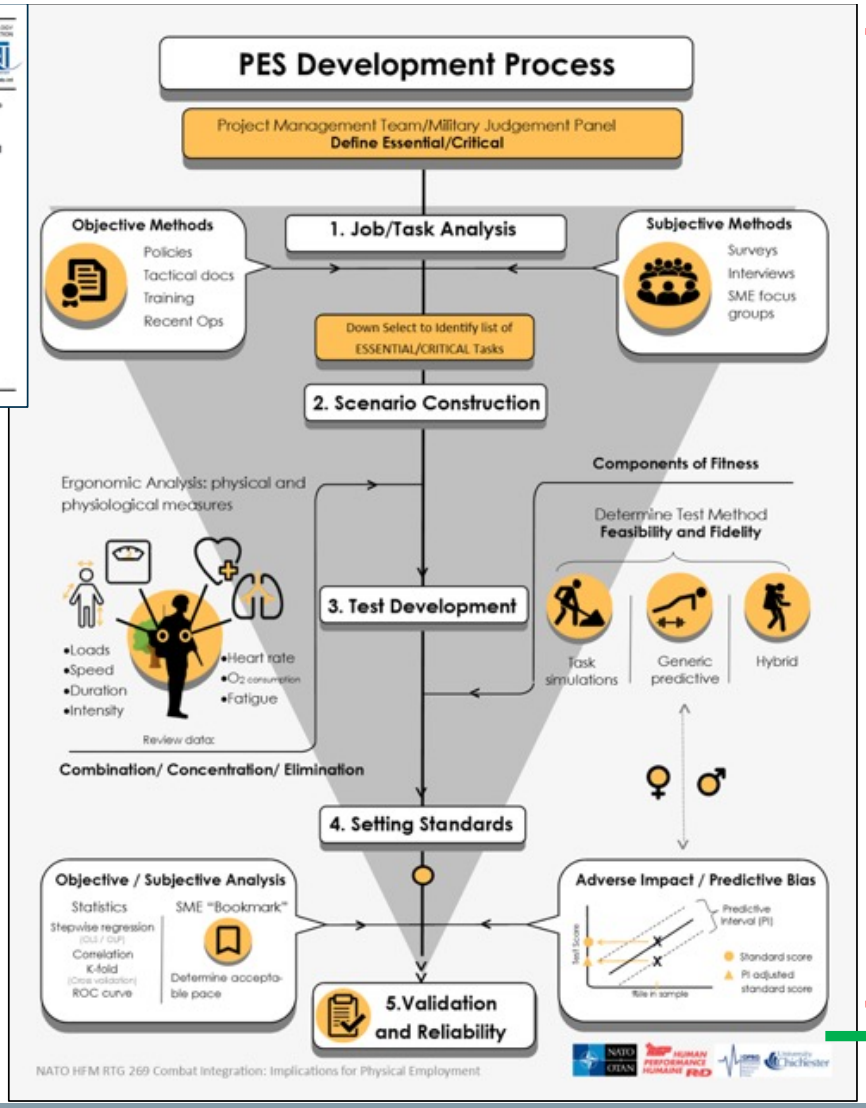
Employment Tribunal will Decide!

Example of PES Cost Savings

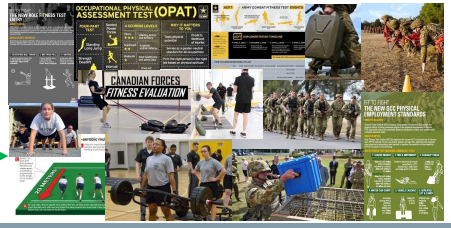
Railroad Industry (5 years of Injury Data)	Test	No Test
Number Hired	12,741	13,897
Number Injured	648	3,898
Musculoskeletal Injuries % of Total Injuries	74.8%	71.1%
Costs for Tested v. Not Tested (p<.01) [Covariates: Age, Job Tenure, & Year Injured]	$15,316	$66,147
Days Lost (p<.01) [Covariates: Age, Job Tenure, & Year Injured]	79.1	142.1
Costs to Replace No Test Worker for Additional Lost Days (regular & overtime pay)	*Regular* $11,601	*Overtime* $17,402

Baker & Gebhardt, 2001

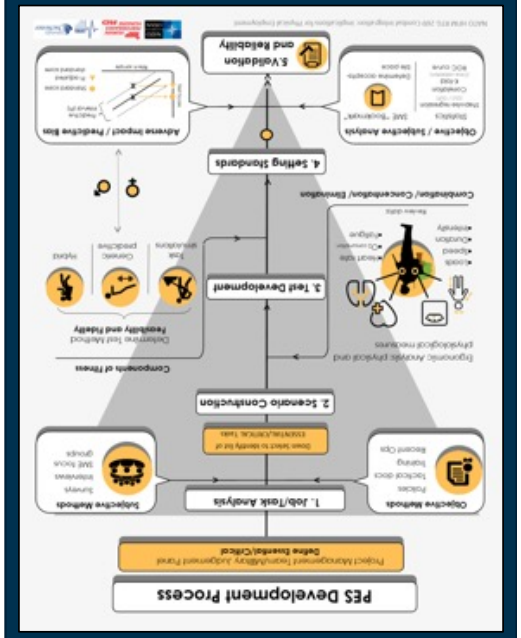


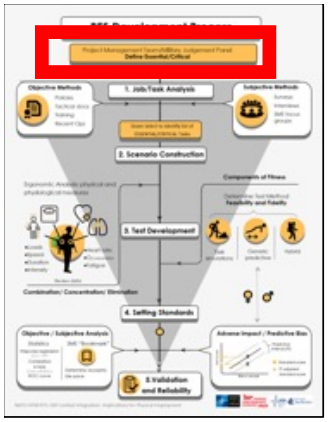


Research and Development.



Evidence Base Underpinning the Tests





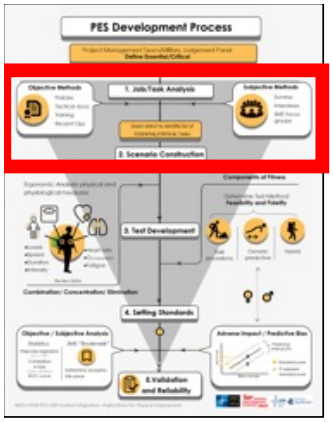
Establishment of Project Management Team / Steering Group

Consisting of representatives from the research team and the employer. Including:

- Employment equity, mission planners.
- labor law representative (Legal counsel).
- Military physical training instructors or civilian exercise physiologists.
- Military health/medical representatives.
- Military Subject Matter Experts (SMEs).

Roles Include:

- Support the data gathering process.
- Review research and provide evidenced-based decisions and guidance.
- Guide implementation and integration with wider military policy.
- Facilitating the recruitment and participation of incumbent workers and potential applicants as research subjects.



Job Task Analysis & Scenario Construction

Workshops

- Technique for Research of Information by Animation of a Group of Experts (TRIAGE)

Surveys

- In-person / Online

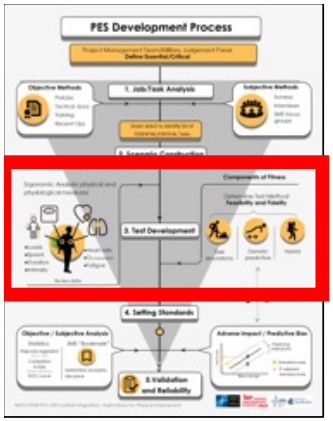
Observations

- Tasks being conducted in-situ during training.
- Some critical tasks might not be able to be observed or detailed measurements taken so may require a scenario construction for ergonomic analysis and physiological measures.

- Wide range of job tasks.
- Individual and team tasks.
- Different equipment and purposes of tasks.

↓

Down selection of critical physically demanding tasks.



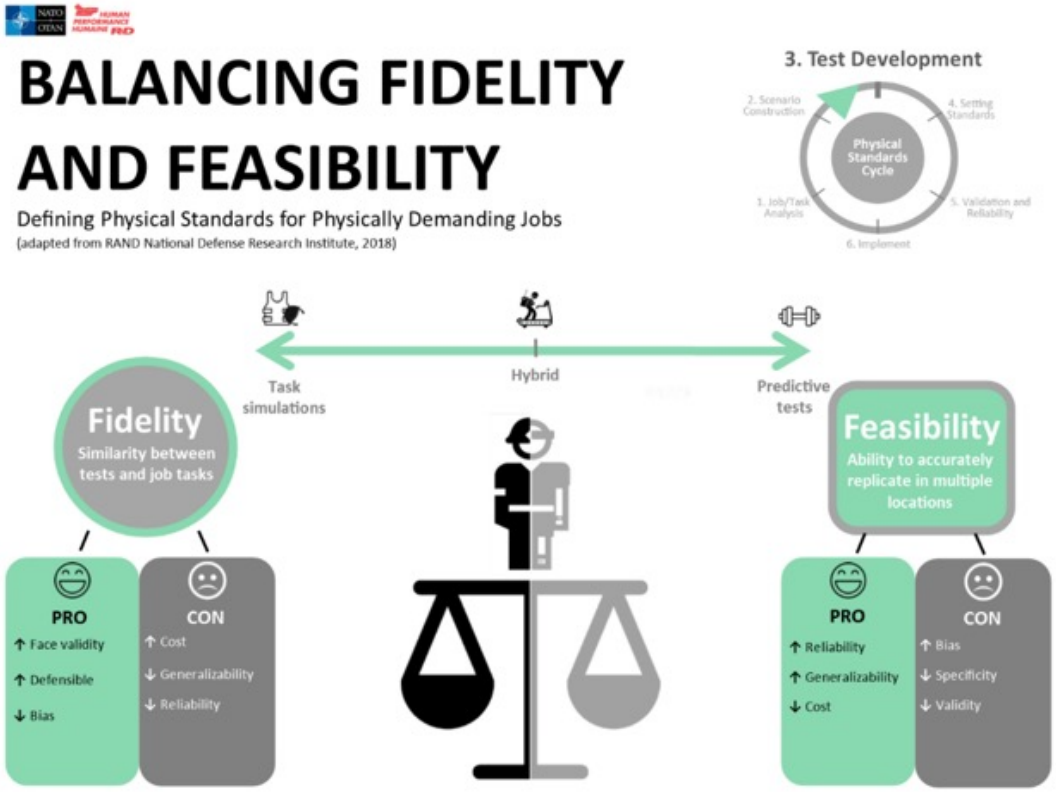
Test Development – 1

DEVELOPMENT AND IMPLEMENTATION OF EVIDENCE-BASED PHYSICAL EMPLOYMENT STANDARDS: KEY CHALLENGES IN THE MILITARY CONTEXT

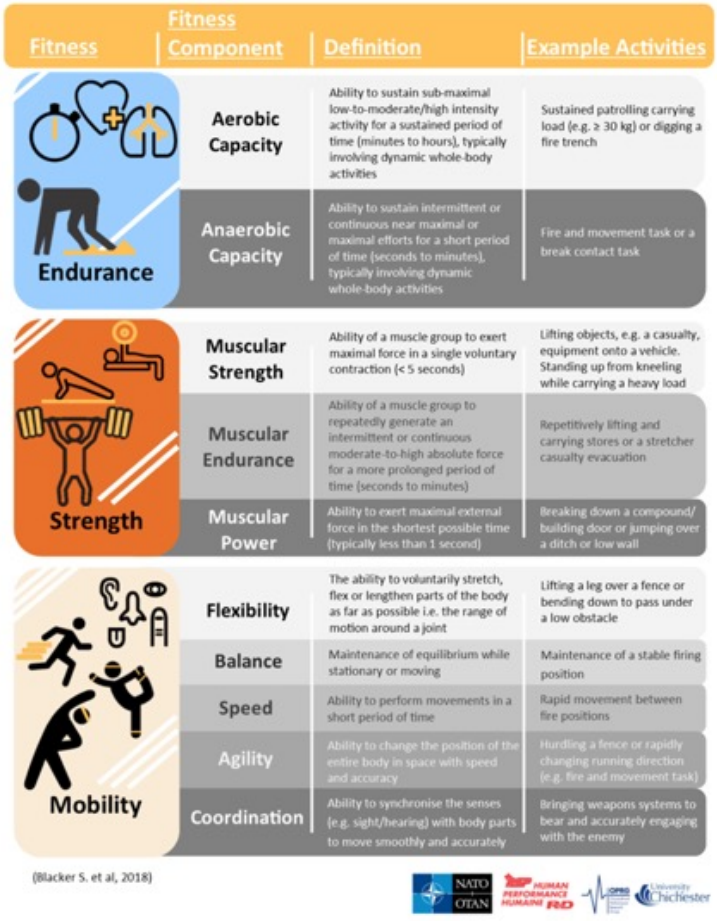
TARA J. REILLY,[1] DEBORAH L. GEIBHARDT,[2] DANIEL C. BILLING,[3] JULIE P. GREEVES,[4] AND MARILYN A. SHARP[5]

[1]Human Performance Research and Development, Canadian Forces Morale and Welfare Services, Ottawa, Ontario, Canada; [2]Human Performance Systems, Inc., Beltsville, Maryland; [3]Land Division, Defence Science and Technology Organisation, Melbourne, Victoria, Australia; [4]Department of Occupational Medicine, HQ Army Recruiting and Training Division, Pirbright, Woking, Surrey, UK; and [5]U S Army Research Institute of Environmental Medicine, Natick, Massachusetts

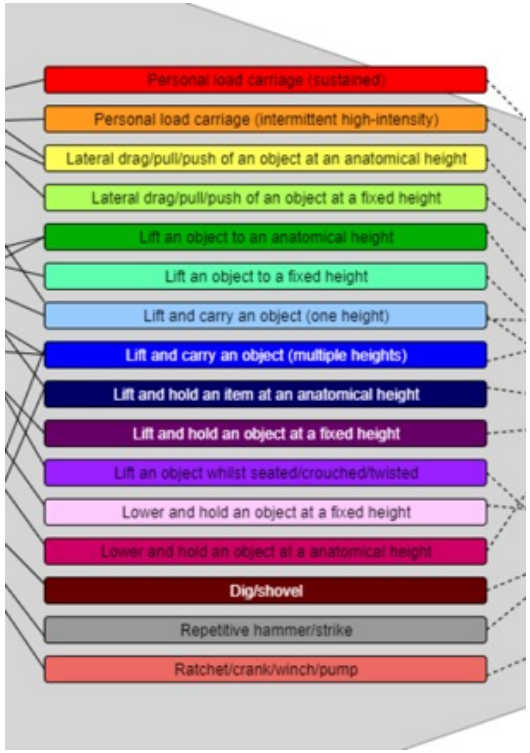
A return on investment (in terms of military capability) from the substantial development costs of employment standards
can only be realized at the point when they are accepted and routinely implemented. Therefore, researchers must also apply careful consideration to factors that are critical in maximizing the potential for successful implementation of the fitness-for-duty regime, such as an appropriate level of simplicity and manageability.



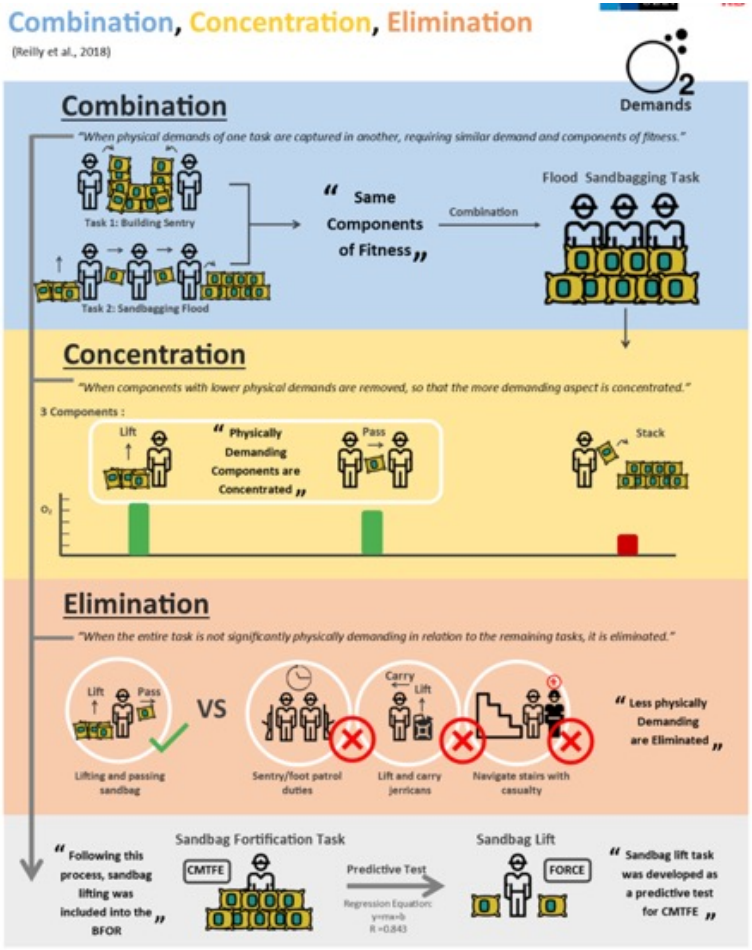
Test Development – 2

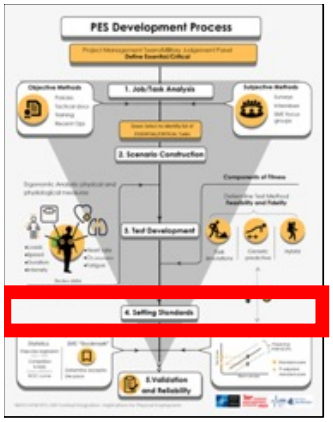


Primary Physical Actions (PPAs)



Hinde et al. 2017 Task grouping by primary physical actions; a technique for developing physical employment standards. Presented at ICSPP 2020





Setting Standards

Eur J Appl Physiol (2013) 113:2435–2446
DOI 10.1007/s00421-012-2569-4

INVITED REVIEW

Physiological employment standards I. Occupational fitness standards: objectively subjective?

M. J. Tipton · G. S. Milligan · T. J. Reilly

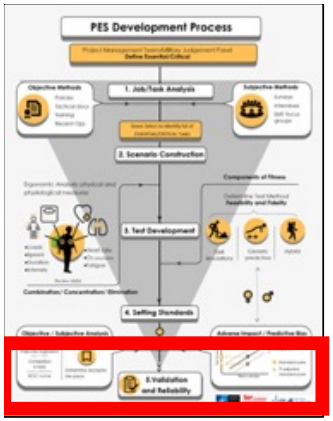
Objective

Data
Test performance
Job role requirements.
Bookmarking.

Subjective

Considerations:

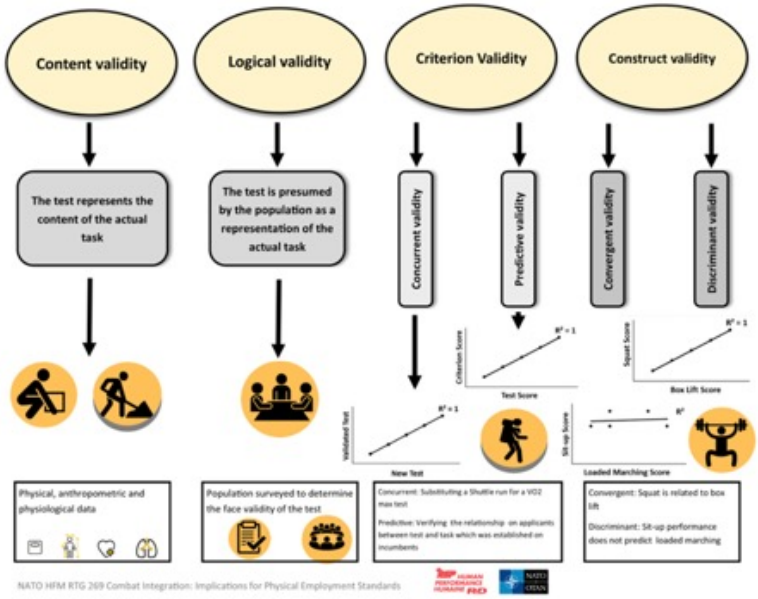
- Impact analysis (pass rates for current population).
- Operational Requirements.
- Inflow and maintenance of workforce.
- Physical performance and injury risk.
- Physical training and development.
- Adverse impact.
- Positive action.



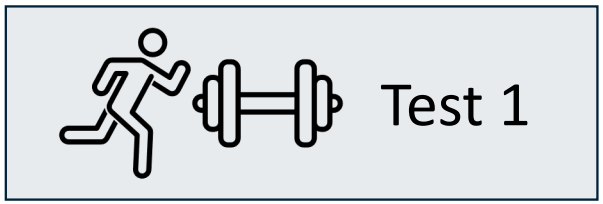
Validity and Reliability

Validity

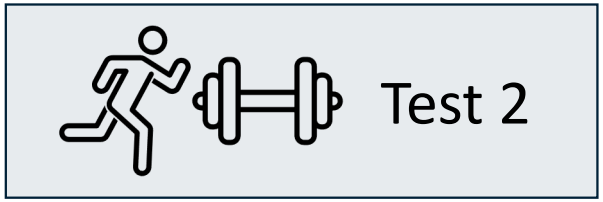
Flow Chart of Validity Concepts to Consider (Based on Concepts Presented in Milligan et al., [16]).



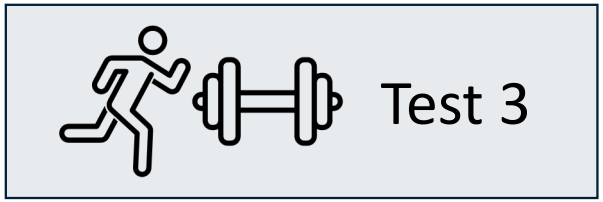
Reliability



Vs.



Vs.



Vs.....

Linking Gym-Based Predictive to Simulation Tests

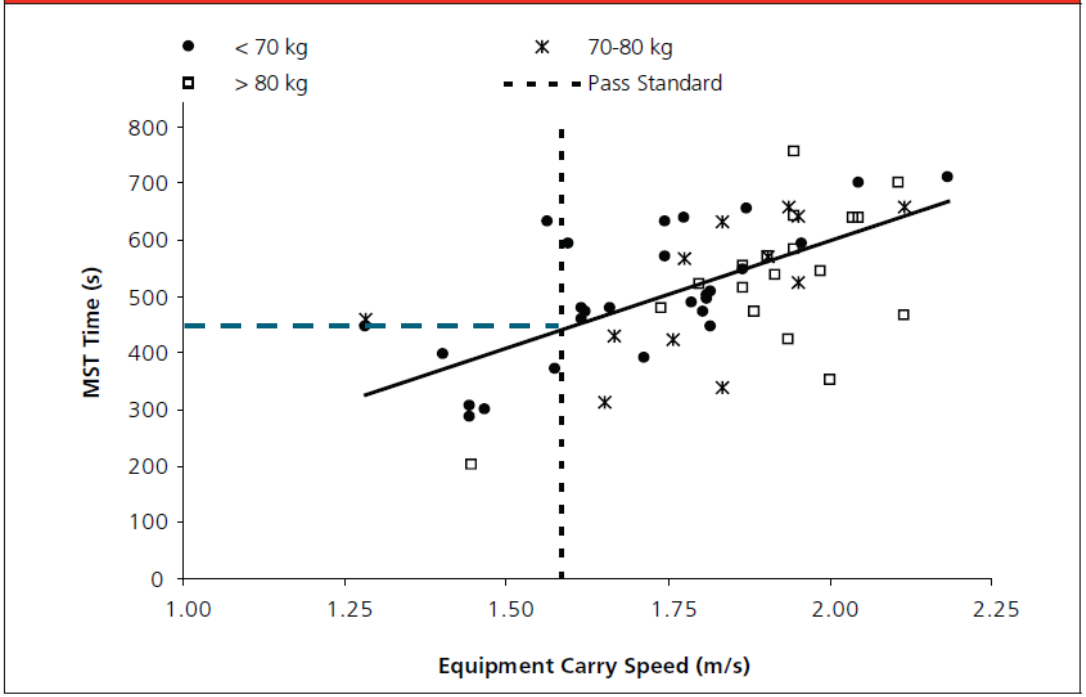
National Firefighter Selection Process
A Comparison of Firefighter Physical Fitness Tests

Rural Fire

50 m Shuttles
Hose Reel, Hoses & Pump

20 m Shuttle Run / Multistage Fitness Test

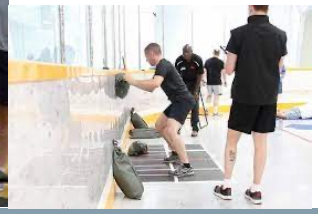
Figure 2: The relationship between ECST, MSFT and body mass

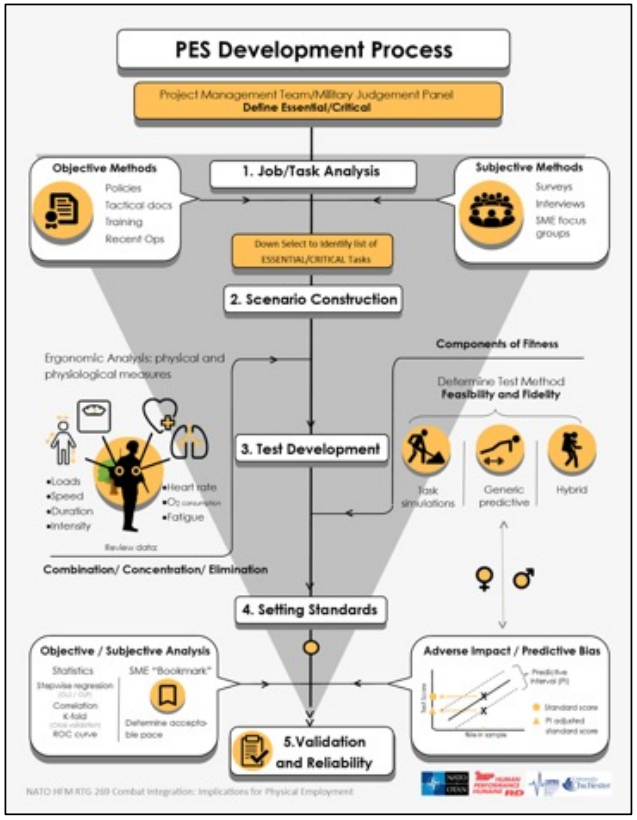



FIT TO FIGHT
THE NEW ROLE FITNESS TEST ENTRY
WHAT IS PES
WHAT IS RFT ENTRY (E)
1 SEATED MED BALL THROW
2 MID THIGH PULL
3 2 KM RUN

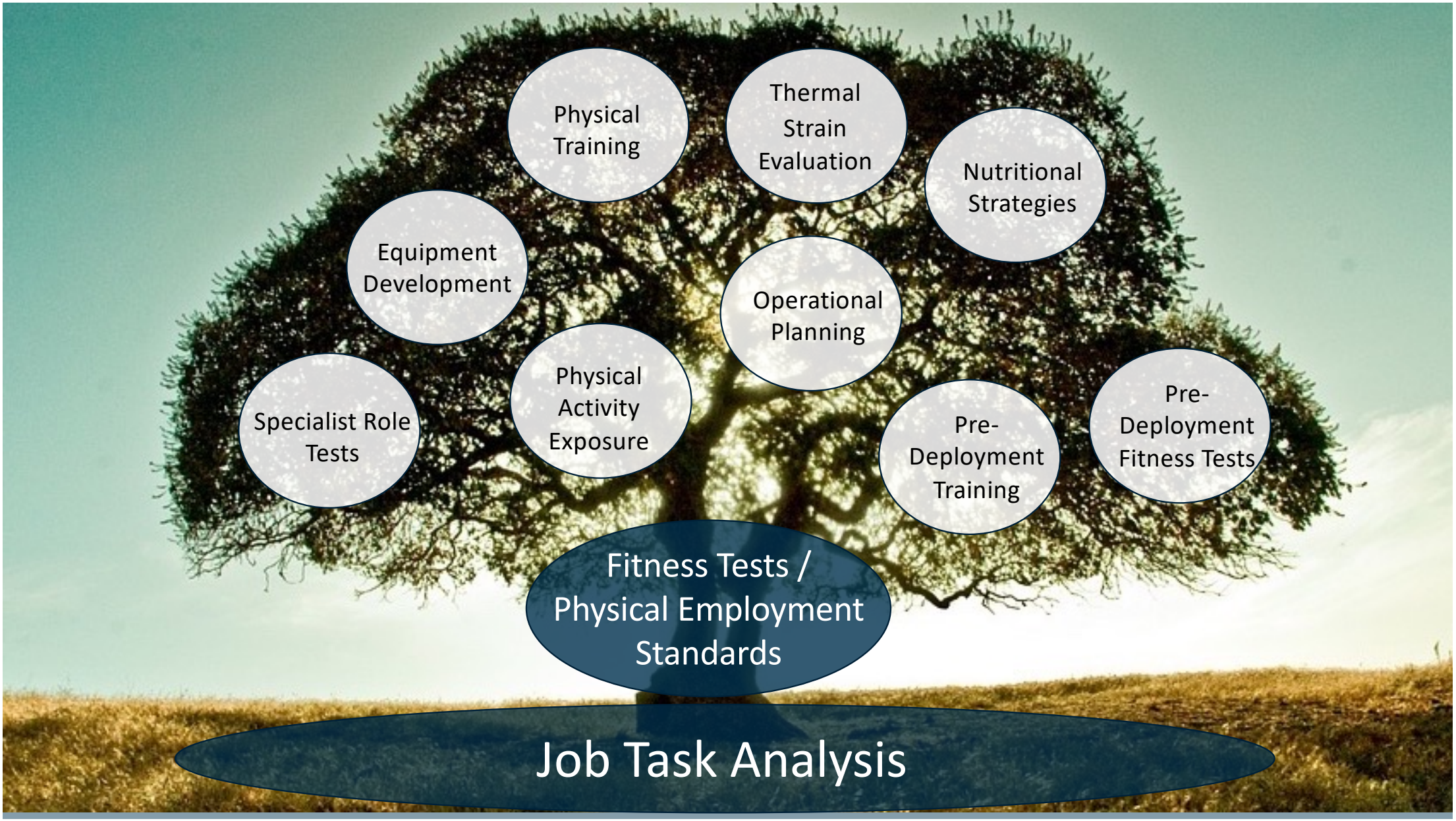

OCCUPATIONAL PHYSICAL ASSESSMENT TEST (OPAT)
FOUR-PART TEST
Seated Power Throw
Standing Long Jump
Strength Deadlift
Interval Aerobic Run
4 SCORING LEVELS
Heavy
Infantry, Armor and Artillery
Significant
Engineer and air defense
Moderate
Most healthcare and admin jobs
Unqualified
Does not meet physical demands
WHY IT MATTERS TO YOU
Tests physical potential
Predicts likelihood of injuries
Serves as a gender-neutral standard for all occupations
Puts the right person in the right job based on physical aptitude
Reduces attrition
Increases potential for recruit success


20 METERS




PES Development Process
Project Management Team/Military Judgement Panel
Define Essential/Critical
Objective Methods
Policies
Tactical docs
Training
Recent Ops
1. Job/Task Analysis
Subjective Methods
Surveys
Interviews
SME focus groups
Down Select to identify list of ESSENTIAL/CRITICAL Tasks
2. Scenario Construction
Components of Fitness
Ergonomic Analysis: physical and physiological measures
Determine Test Method
Feasibility and Fidelity
3. Test Development
Task simulations
Generic predictive
Hybrid
•Loads
•Speed
•Duration
•Intensity
•Heart rate
•O2 consumption
•Fatigue
Review data:
Combination/ Concentration/ Elimination
4. Setting Standards
Objective / Subjective Analysis
Statistics
SME "Bookmark"
Determine acceptable pace
Adverse Impact / Predictive Bias
Predictive Interval (PI)
Standard score
PI adjusted standard score
5.Validation and Reliability
NATO HFM RTG 269 Combat Integration: Implications for Physical Employment


FIT TO FIGHT
THE NEW GCC PHYSICAL EMPLOYMENT STANDARDS
WHAT IS GCCPES
WHAT IS RFTS
ROLE FITNESS TEST (SOLDIER) (ANNUALLY) 1 TO 6
1: LOADED MARCH
2: FIRE & MOVEMENT
3: CASUALTY DRAG
4: WATER CAN CARRY
5: VEHICLE CASEVAC
6: REPEATED LIFT & CARRY


Physical Training
Thermal Strain Evaluation
Nutritional Strategies
Equipment Development
Operational Planning
Specialist Role Tests
Physical Activity Exposure
Pre-Deployment Training
Pre-Deployment Fitness Tests
Fitness Tests / Physical Employment Standards
Job Task Analysis

Implications for Physical Employment Standards (PES)

The 33rd Finnish Exercise Testing Symposium,
Helsinki Finland, March 29-30, 2023
Main theme: Fitness Testing in Tactical Occupations

Professor Sam Blacker (PhD)

Occupational Performance Research Group

Institute of Sport Nursing and Allied Health

University of Chichester