



A division of CF Morale & Welfare Services  
Une division des Services de bien-être et moral des FC

# Using Evidence of Effective Incentives to Enhance Physical Health and Fitness of the Canadian Armed Forces.

**Dr. Tara Reilly**

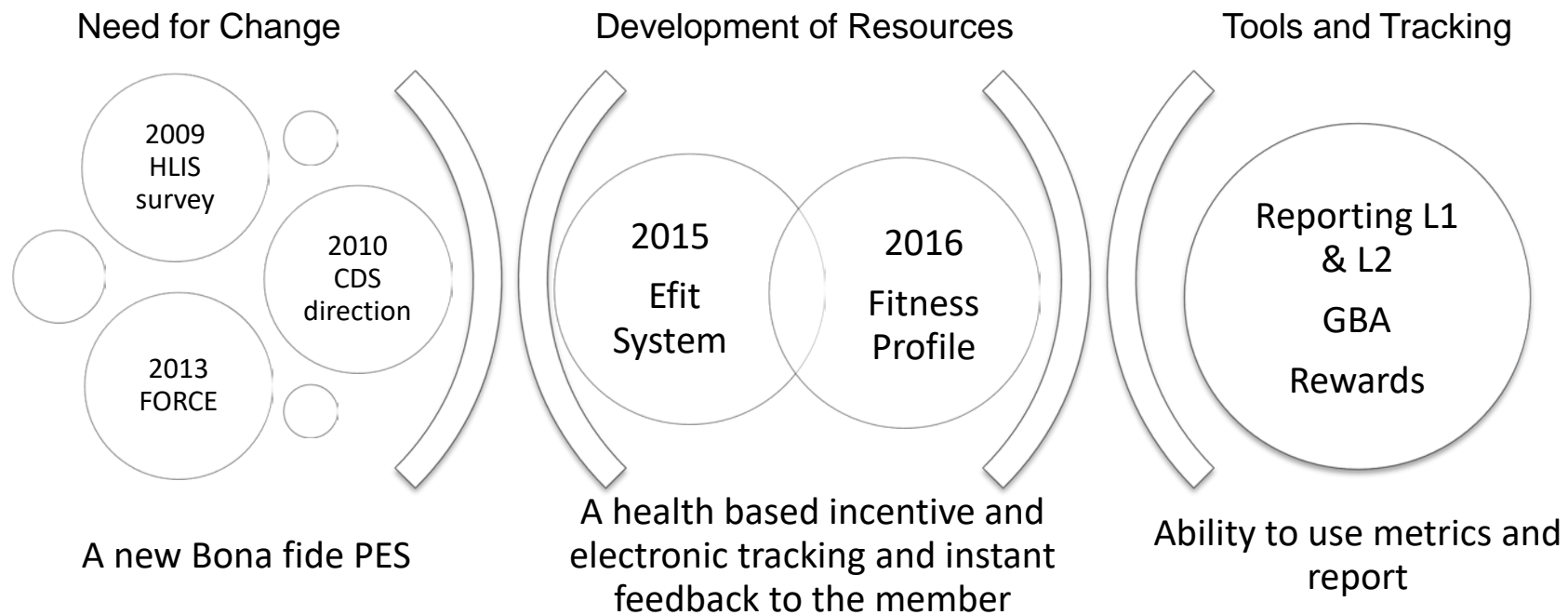
**Phil Newton**

**Daryl Allard**

**Patrick Gagnon**

**Human Performance  
Research and Development  
Canadian Forces Morale  
and Welfare Service**

# The evolution of evidence fitness and health incentivization in the CAF





# Addressing the Need to Incentivise Health Related Fitness

Vehicle Extrication



Stretcher Carry



Pickets and Wire carry



Picking and Digging



Escape to Cover



Sandbag Fortification





# Addressing the Need to Incentivise Health Related Fitness

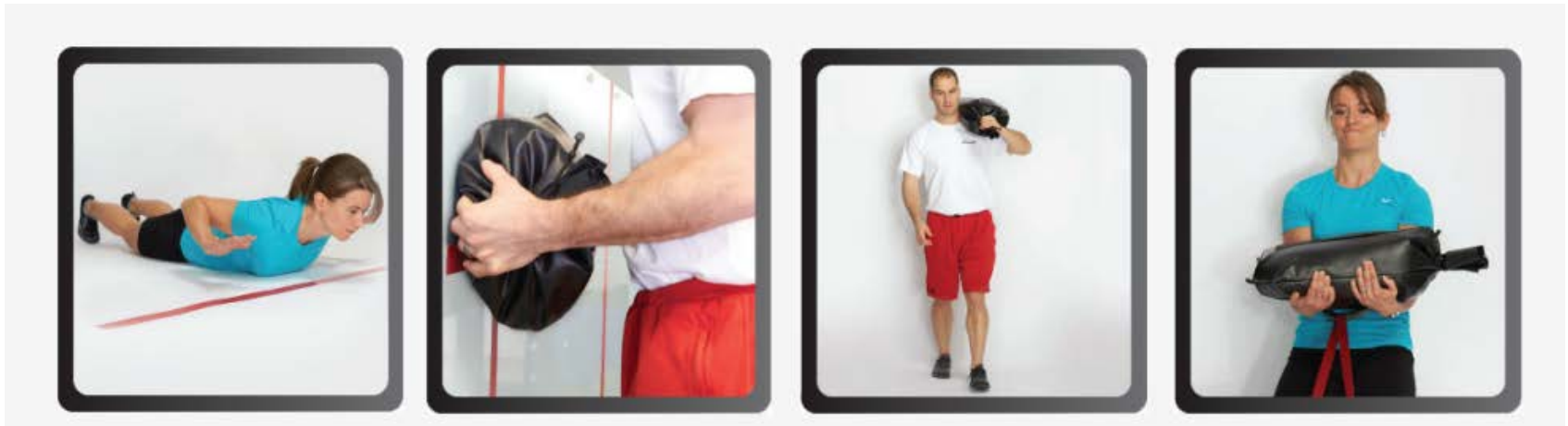
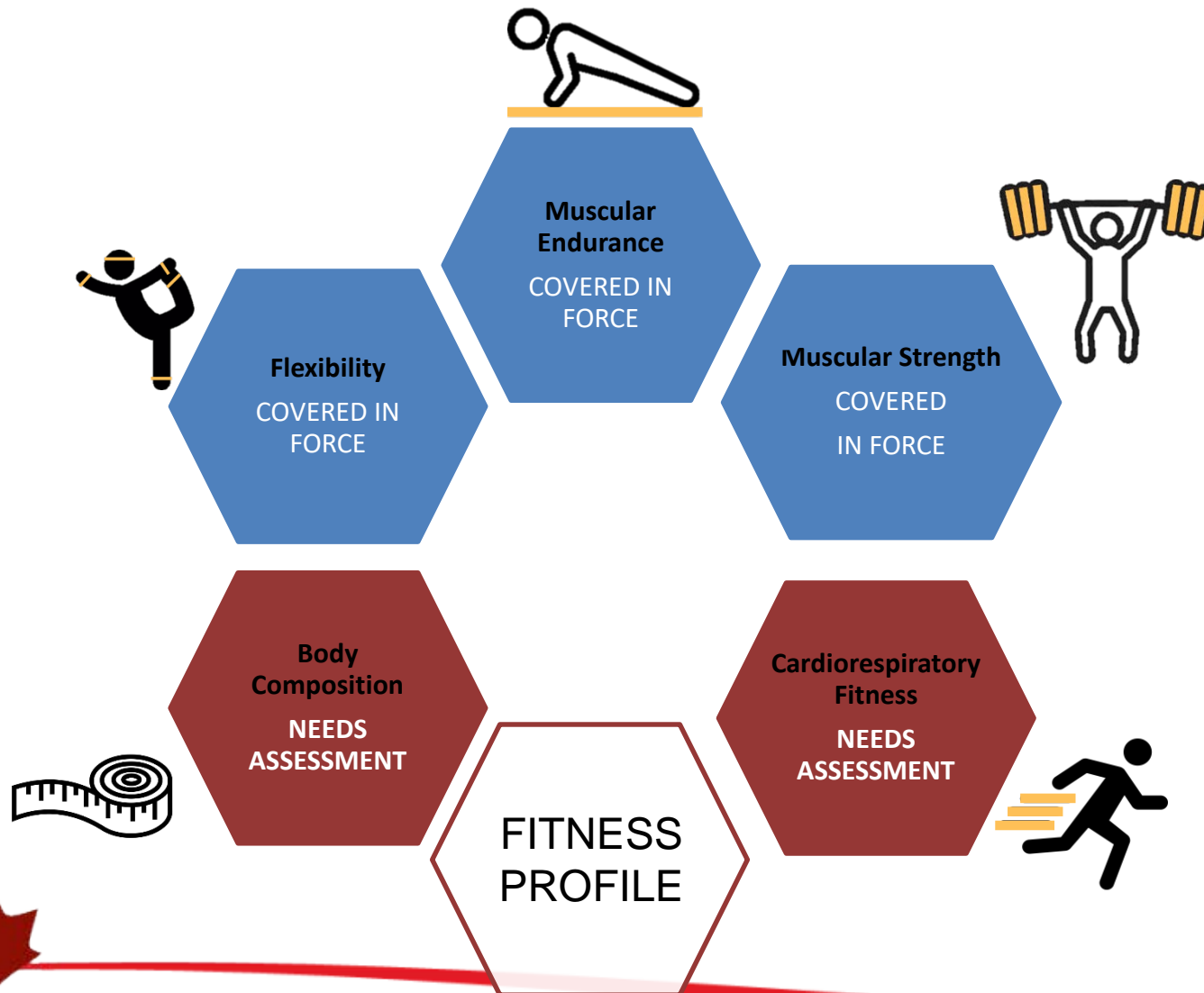


Figure 1: The FORCE Evaluation performed as 20m rushes (20mR), Sandbag Lift (SBL), Intermittent Loaded Shuttle (ILS), and SandBag Drag (SBD).



# The 5 Components of Physical Fitness



# Cardiorespiratory Fitness and All-Cause Mortality



- large-scale longitudinal epidemiological studies which tested various components of fitness and then followed individuals for as many as 35 years
  - 6910 cases of all-cause mortality in 102 908 participants
  - 4484 deaths attributed to Coronary heart disease (CHD) and Cardiovascular disease (CVD) in 84 323 participants.
  - Kodoma et al (2009) concluded that better CRF was associated with lower risk of all-cause mortality, CHD and CVD
  - 1-MET increase in a person's  $O_{2max}$  was approximately associated with a 13% and a 15% risk reduction in all -cause mortality and CHD/CVD, respectively



# Other military Health related fitness standards



- US National Guard
  - Guard members were experiencing CVD symptoms despite being screened as low or moderate risk on the Framingham profile (469 cardiac referrals of deployed soldiers with a mean age of 39 years) (Talbot et al., 2009).
  - 2-mile run and categorize personnel based on a 10-year CHD risk



# Other military Health related fitness standards



- US Air Force
  - Fitness test creates a health profile which was determined based on CVD risk, and risk of injury
  - 1.5 mile run, push-ups, sit- ups and abdominal circumference (Baumgartner et al., 2018)
  - This model was also employed to guide the Fitness Profile for the CAF
  - Emergency services in the UK and Canada (Reilly and Tipton, 2005; Poplin et al., 2014) have health related CV fitness standards



# Aerobic fitness: predicting from FORCE

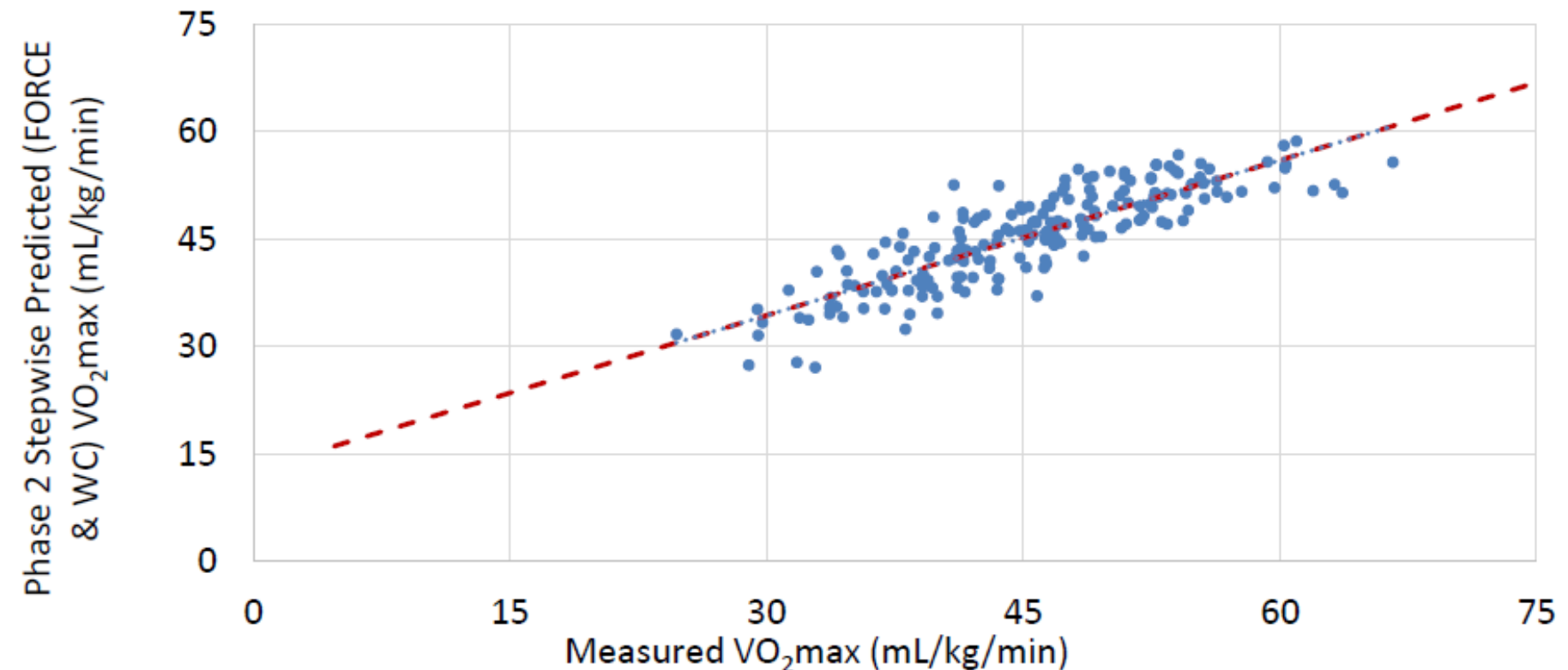


2014-2016 the  $\text{O}_{2\text{max}}$  max FORCE relationship

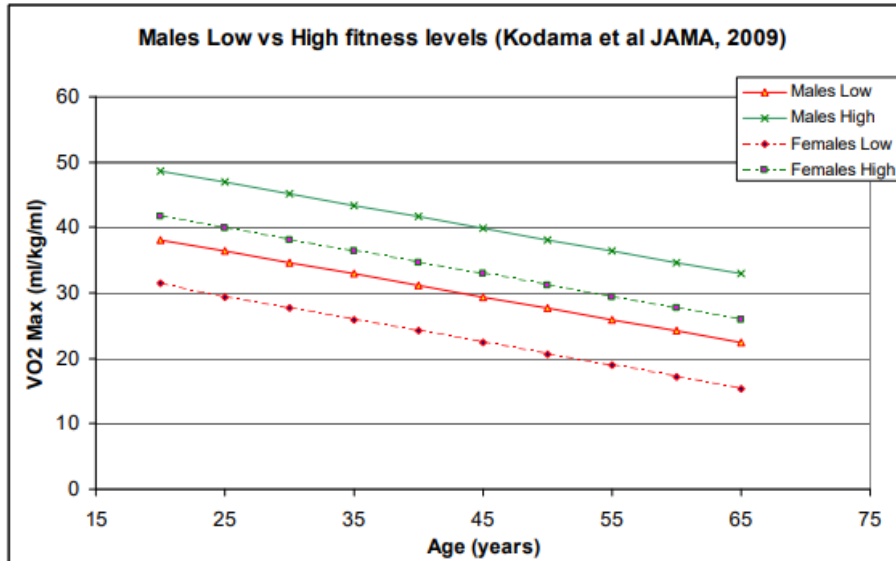
248 healthy adults (73 females) aged 17-59 years performed FORCE at maximum effort and a GXT (a maximal graded exercise treadmill test).

Asking PA is not effective or significantly related with CVD

Predicted  $\text{VO}_{2\text{max}}$  from FORCE + WC compared to directly measured  $\text{VO}_{2\text{max}}$   $R^2 = 0.72$



# The Fitness Profile: Scoring for Health Related Fitness



**Figure 2. Cut-offs for low and high CRF based on Kodoma et al, 2009.**

**Table 1. High and low risk cut-offs based on Kodoma et al (2009) (Reilly, 2014).**

Age	VO <sub>2</sub> max (mL/kg/min)			
	Male		Female	
	High	Low	High	Low
15-20	38.1	48.6	31.5	41.7
20-25	36.4	46.9	29.4	39.9
25-30	34.6	45.1	27.6	38.1
30-35	32.9	43.4	25.9	36.4
35-40	31.1	41.6	24.1	34.6
40-45	29.4	39.9	22.4	32.9
45-50	27.6	38.1	20.6	31.1
50-55	25.9	36.4	18.9	29.4
55-60	24.1	34.6	17.1	27.6



# The Fitness Profile: Body Comp



WHR<sup>b</sup>

<0.9

≥0.9

Waist ci

<40

≥40

BMI

18.5–2

25–29.

≥30

Percenta

10–19.

20–24.

≥25

Percenta

10–19.

20–24.

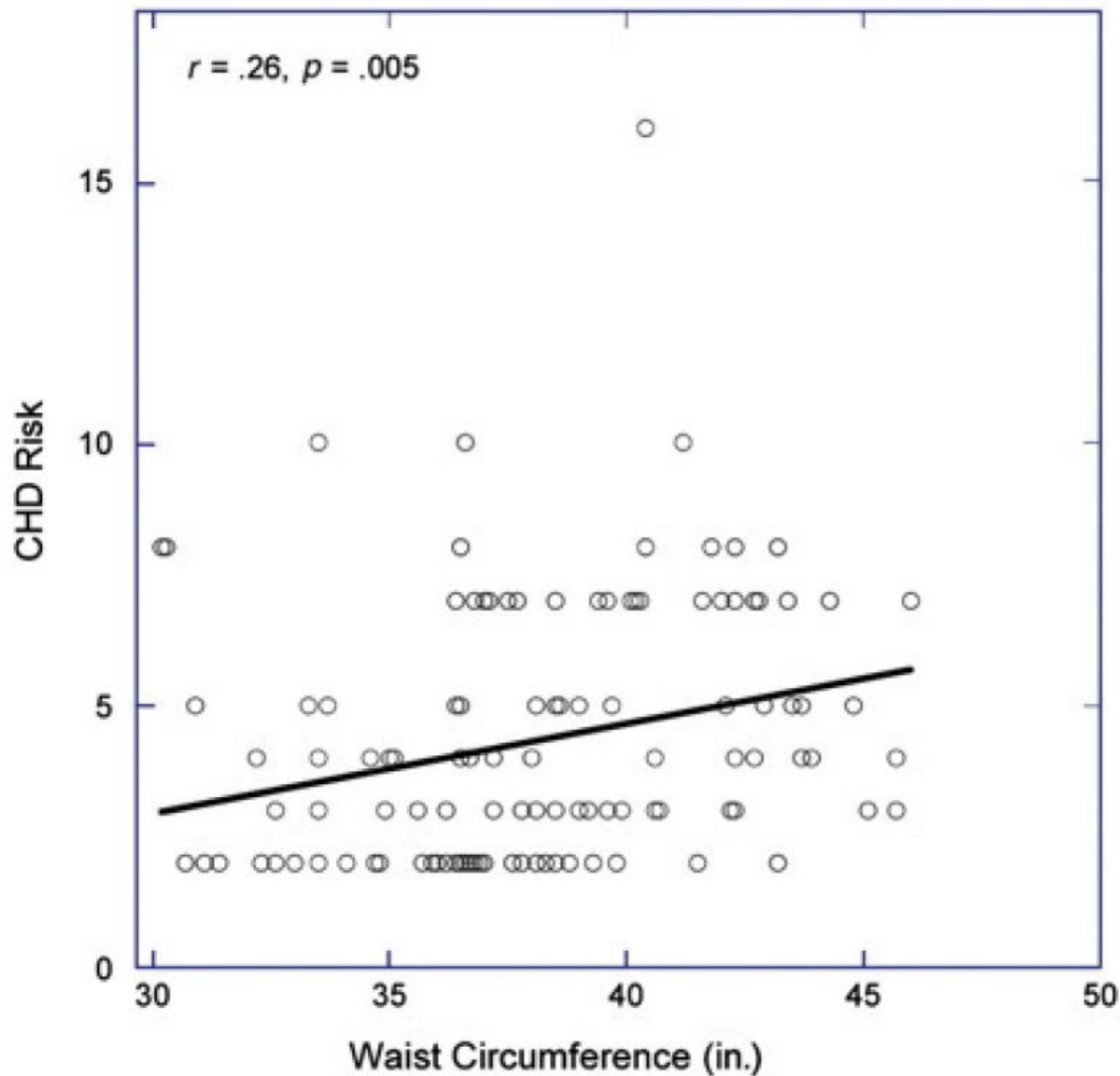
≥25

<sup>a</sup> W

percenta

<sup>b</sup>  $F($

<sup>c</sup>  $F($





# The Fitness Profile: Health Related Fitness

**Results from the 2017 survey on the WC measurement**

**624 participants from 4 bases/wings**

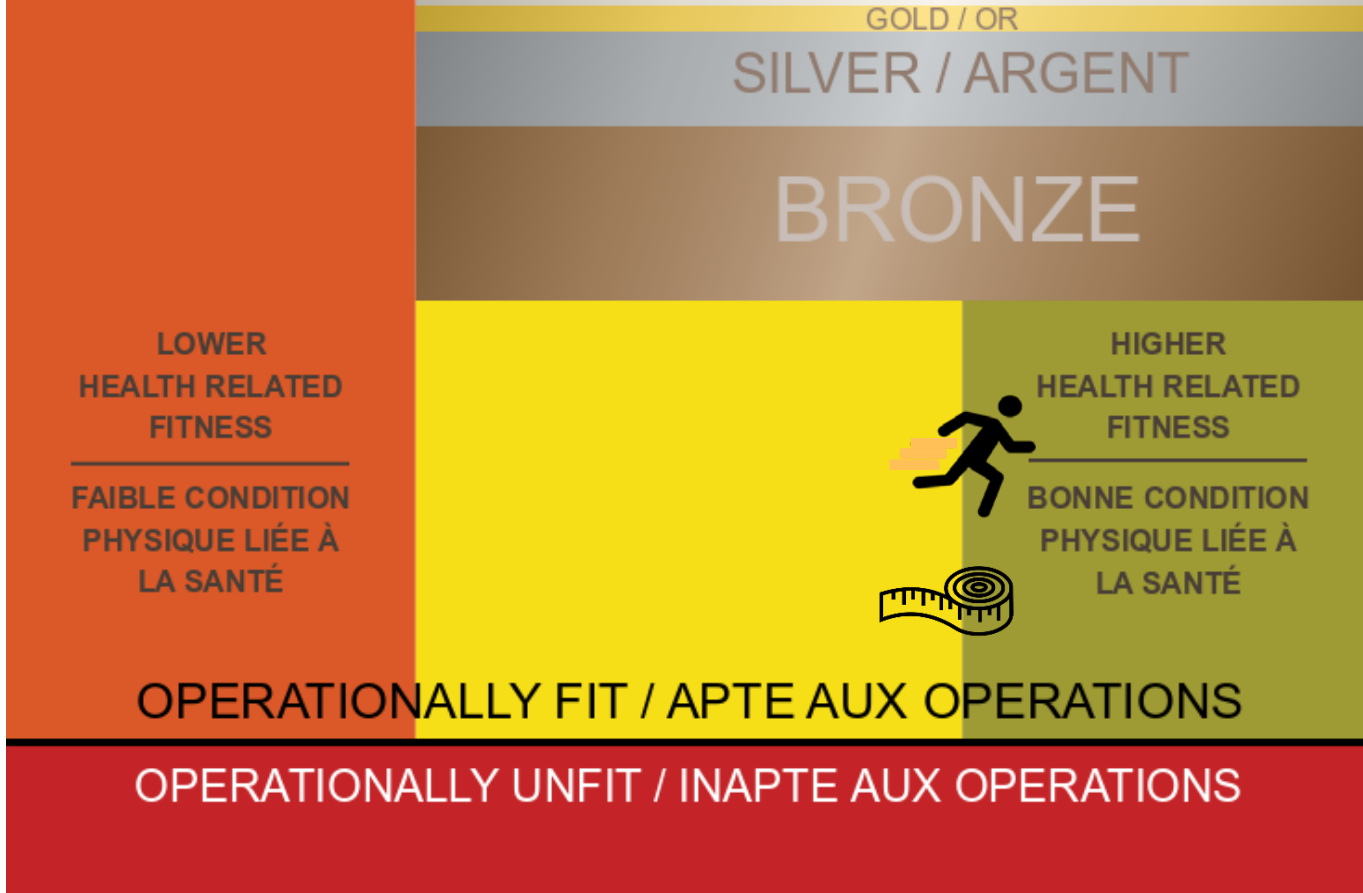
**27% female**

**Large range of WC**

	Agree strongly (%)	Agree moderately (%)	Agree a little (%)	Neither agree nor disagree (%)	Disagree a little (%)	Disagree moderately (%)	Disagree strongly (%)	Do not know or not applicable (%)
Understood reason for taking AC measure	51.0	25.7	11.3	3.5	3.2	0.7	0.7	0.5
Comfortable with having AC measure taken in this way	58.1	21.1	7.3	4.1	2.5	1.7	1.5	0.2
Understood fitness profile result	75.5	13.7	4.6	0.8	0.3	0.2	0.5	0.3
Believed fitness profile result was accurate	48.6	31.1	6.9	1.7	3.4	1.9	1.9	0.5
Plan to make changes to lifestyle based on result	34.6	29.2	14.9	8.4	1.4	2.9	3.9	1.0



# Health related fitness: 25% WC + 75% VO<sub>2</sub>



The Vertical (Y) axis refers to points earned on the FORCE Evaluation and “Occupational Fitness” whereas the Horizontal axis (X) refers to points earned on the VO<sub>2max</sub> prediction (75%) + WC (25%) translated to health related fitness.



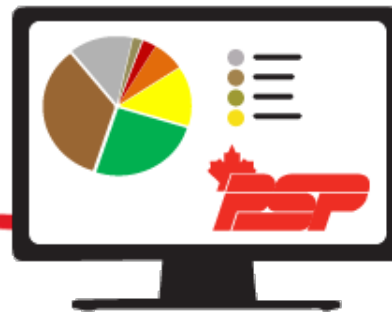
# The Fitness Profile: Incentive levels

Percentile	Incentive Level
>50 percentile	Eligible for incentive
>66 percentile	Bronze
>86 percentile	Silver
>98 percentile	Gold
>99.9 percentile	Platinum

## Evaluations by Fitness Level and Gender

Gender	Platinum	Gold	Silver	Bronze	Green	Yellow	Orange	Not Available	Total Evaluations	Average Level
Male	880	5,035	12,427	13,928	2,942	5,632	2,215	184	43,243	Bronze
Female	101	542	1,704	2,211	854	982	189	181	6,764	Bronze

# Addressing The Need to Have a Dynamic and Electronic Reporting Platform



**FORMeFIT**  
REPORTS / RAPPORTS

# Addressing The Need to Have a Dynamic and Electronic Reporting Platform

## Working groups included:

- Members of Judge Advocate General
- Members of Clinical Council (Surgeon General)
- Director Health Services Delivery
- Director Access to Information Privacy

Risk Analysis considering the privacy/legal concerns of collecting personal data on CAF members

Respecting Data Privacy

Providing Correct Framework for CO's

Ensuring Results compliment, and not contradict those from Health Services

# Instant feedback to the CAF member

Back
Pilot Average Data
Pilot Individual Data
Max RPE data

## Fitness Profile

Show / Hide Goal Setting
Show / Hide Labels
?

OPERATIONAL FITNESS: FORCE EVALUATION SCORE

HEALTH RELATED FITNESS: PREDICTED VO<sub>2</sub> & WAIST CIRCUMFERENCE SCORE

**Current Operational Fitness**

Results	Time	Score
20mR	0:33.0	96.5 / 100
SBL	0:52.0	98.4 / 100
ILS	2:25.2	98.6 / 100
SBO	0:11.1	98.2 / 100
Total	4:01.3	392 / 400
Incentive Level	<b>GOLD</b>	

**Goal Setting**

Time	Score
0:31.4	98.9
0:49.4	99.2
2:17.9	99.5
0:10.5	99
3:49.0	397
<b>PLATINUM</b>	

5 points from PLATINUM  
Male 40 - 44

**Current Health-Related Fitness**

Predicted VO <sub>2</sub> (mL/kg/min)	51.5	72.4 / 75 Excellent
Waist Circ. (cm)	92	16.7 / 25 Normal
Health Total	89.1 / 100	

**Goal Setting**

52.8	73.9 Excellent
92	16.7 Normal
90.6	

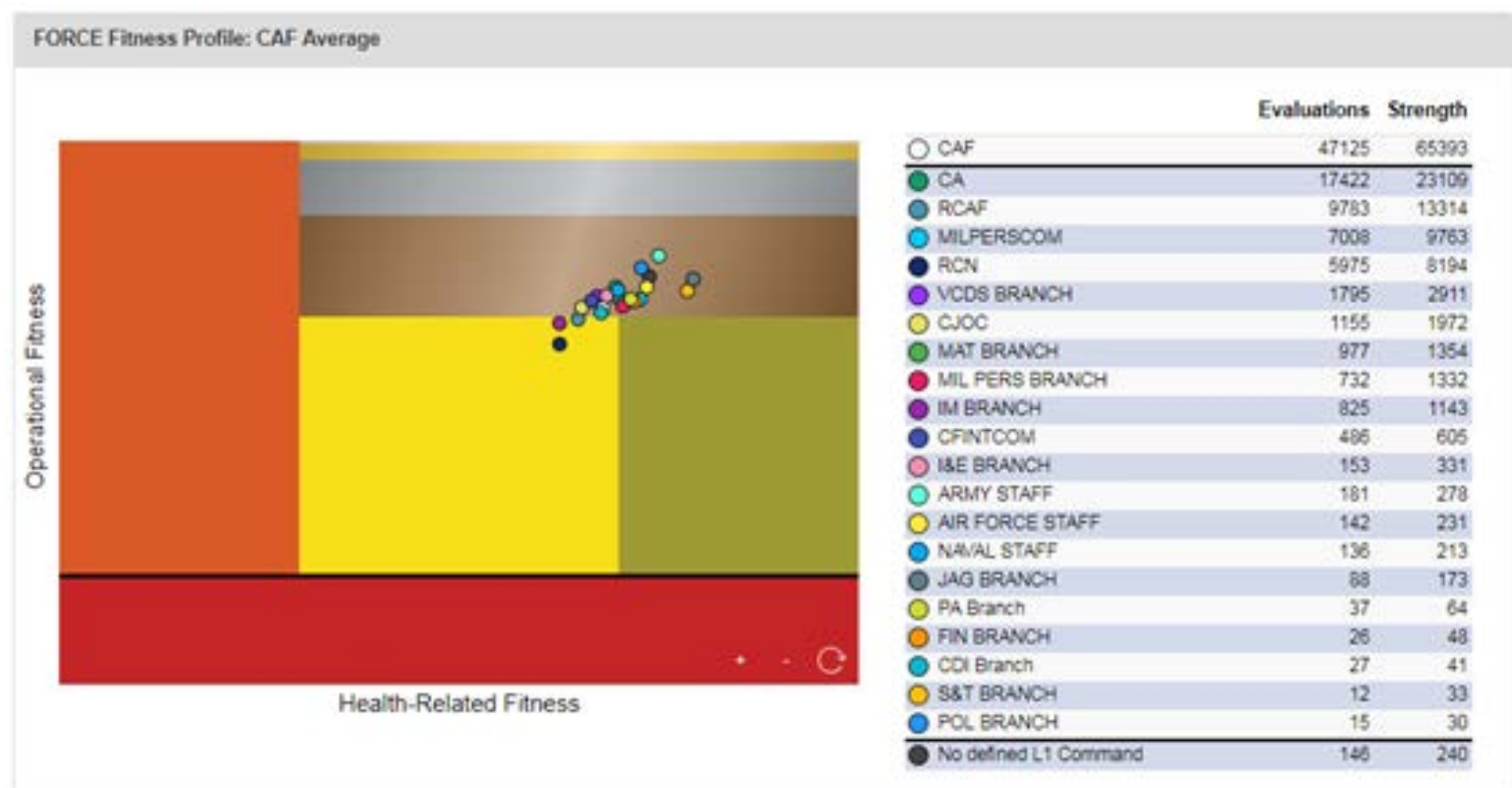
Age: **40**  
Gender: **Male**





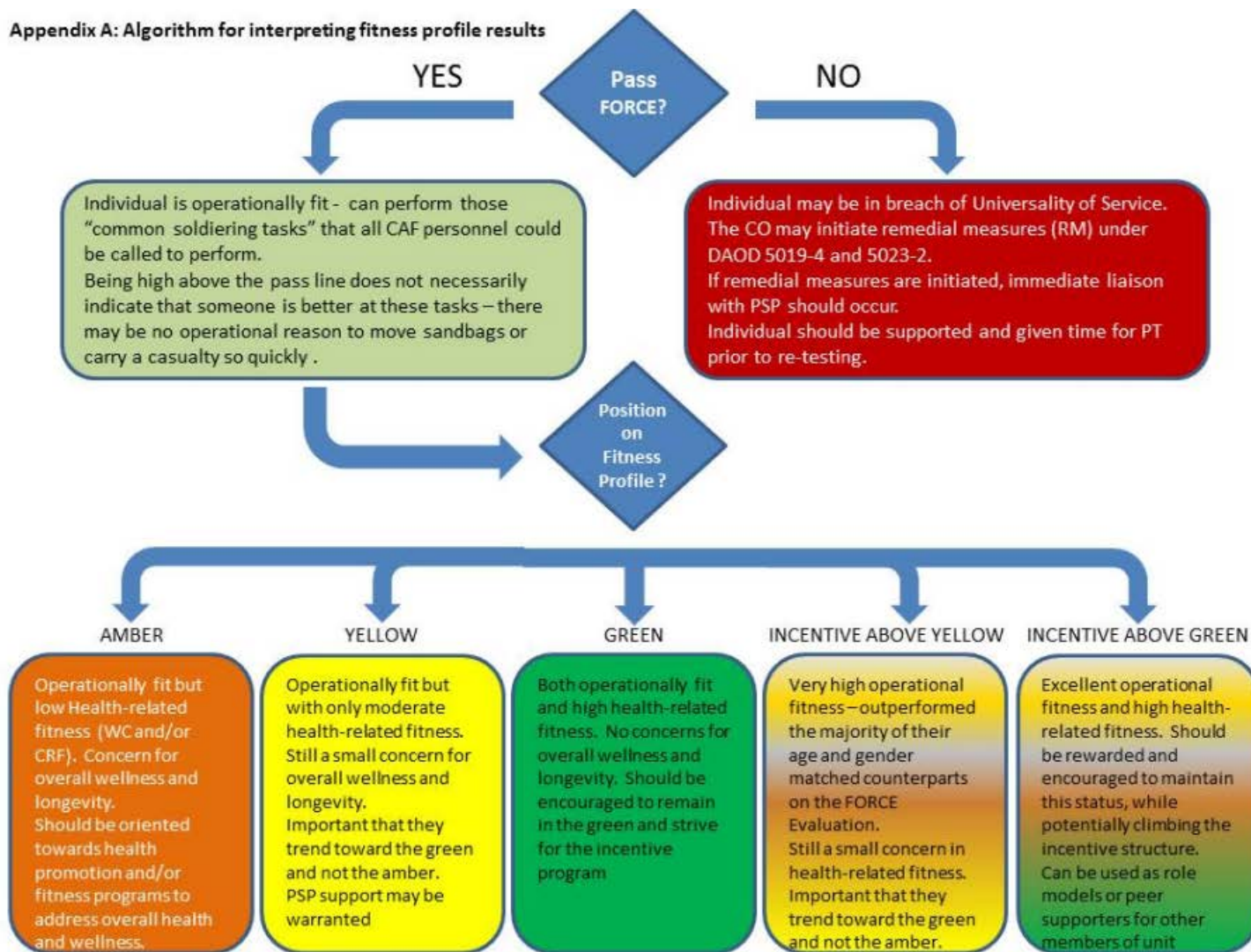
# Quarterly feedback to leaders

## Fitness Profile for Fiscal year 17/18



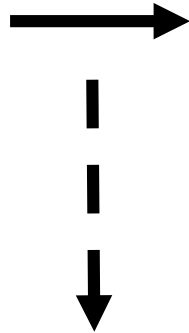
# Aid to Commanding Officers for Interpreting the Fitness Profile

Appendix A: Algorithm for interpreting fitness profile results



# How is feedback/evidence used to measure effectiveness

## FORCE Evaluation



## Electronic Reporting



**FORMeFIT**  
REPORTS / RAPPORTS

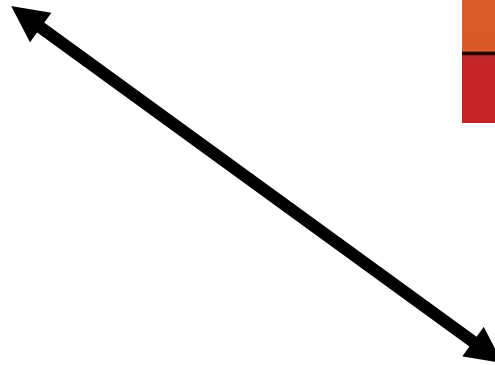


## Fitness profile



More information needed on:

- Primary reserve
- Members on temporary medical categories
- Maternity/Paternity leave
- Evaluation reporting on paper
- No show/avoiders



New Health and Fitness Strategy (BALANCE) for CAF in 2019



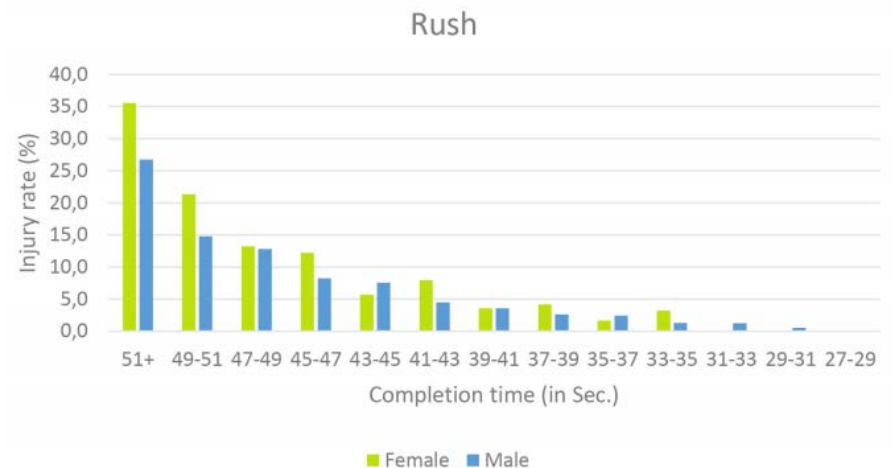
# Future Directions: MSKI

Link between MSKI and CRF (1MET can reduce the risk of injury by 14%)

Performance on the FORE Evaluation can be used to determine risk of MSKI – 3 out of 4 components of FORCE evaluation found to be significant predictors of MSKI (Chasse et al 2019)

Potential to include a risk of MSKI based on FORCE evaluation performance in the Fitness Profile in the future

## RUSH



# Future Directions: Effectiveness

Feedback on the usefulness of the Fitness Profile and FORMeFit reporting

- 37 Fitness and Sports Managers from bases and wings all over Canada surveyed on the effectiveness of the FORMeFit reporting system (Chenard, 2019)
- 96% of Fitness and Sports Managers had accessed and briefed CoC at their respective locations at least once
- 25% had met and briefed CoC 3 times or more



# Summary

- CAF personnel are now provided with a metric on their aerobic fitness and their body compositions, components of fitness that were missing in their PES result.
  - FORCE Evaluators have a better basis from which to direct CAF personnel to resources
- Results are automatically transmitted to the Human Resource Management System (DND/GUARDIAN)
  - In addition, Medical officers can ask a CAF member at their periodic health assessment if they can access the members FP
  - The CoC are provided a reporting forum for the Operational and Health related fitness of their subordinates, as well as direction how best to use the information
  - The 2019 Health and Fitness Strategy BALANCE can be evaluated for longitudinal effectiveness with a sensitive metric.
- The relationship between MSKI and the FP identifies another dimension of risk prediction and therefore has the potential to further enhance the Health related physical fitness component of the Fitness Profile.



