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Australian Government
Department of Defence
Science and Technology

HPR*net*

Human Performance Research *network*

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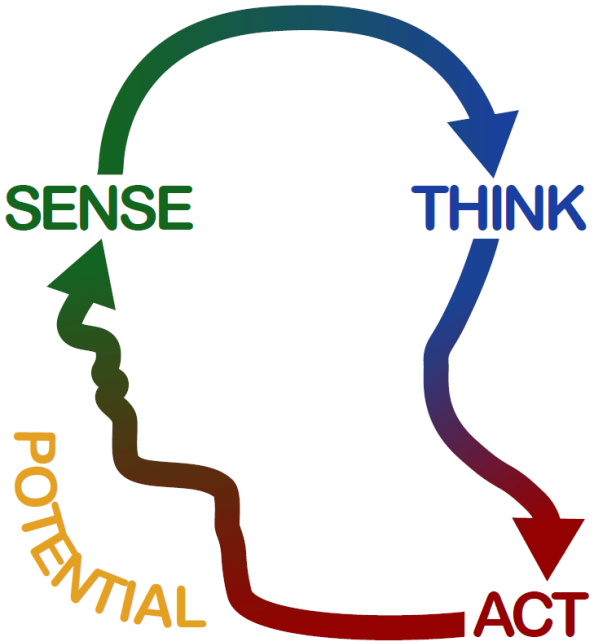
Focus

Focusing on the way entities (people/robots) function in the world, individually and in aggregate, can help to identify the practical relevance of emerging technologies.

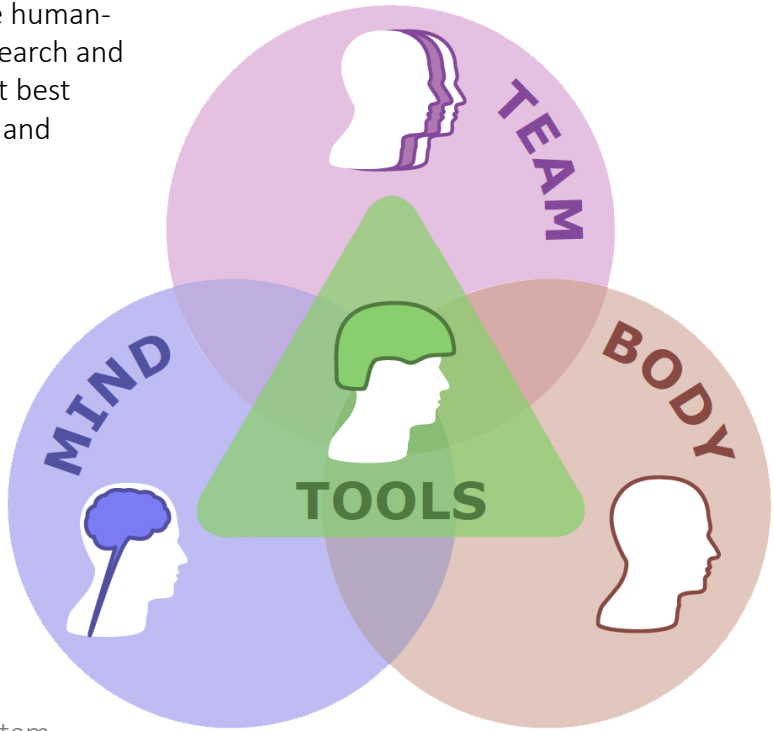


Core Functions

*Living things (and autonomous systems) operate in a continual cycle. We sense **our status and the world** around us … we **reflexively or reflectively** respond … interacting with the world through **action or communication** … continually assessing the immediate and cumulative effects of our actions and considering our next response. Our potential to perform these functions over time is strongly influenced by our **health, energy and emotions**.*

Expertise

Considering the intersection of the human-system can help to identify the research and development disciplines that might best combine to optimise performance and resilience for mission success.

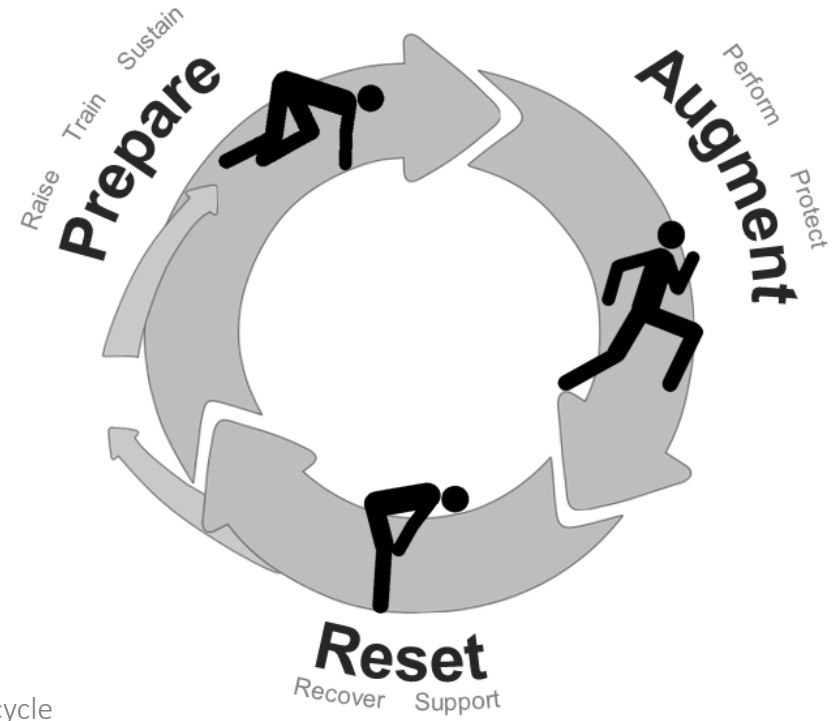


The Human System

*There are a broad range of human science disciplines advancing our understanding of human performance and resilience. The many specialisations across **physiology** and **psychology** intersect when studying real world performance. Methods related to behaviours and **social** interaction at the team, organisation and population levels further inform human-system performance. Enhancing military capability requires a range of research disciplines overlaid with the methods that **design, integrate and iterate** the tools and techniques of the warfighter'.*

Impact

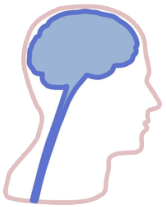
The operational lifecycle can help to understand the path to achieving a capability impact through research and development.



The Operational Lifecycle

*The investment of time and money on research demands an viable path to impact. It is important to understand how the ADF **prepare to perform** their missions, **augment** warfighters with tools and techniques, and support **recovery and resilience** to prevail and reset. Army, Navy and Air Force appoint senior officers with responsibility for these distinct phases. Impact through S&T depends on the insights and ongoing support of these stakeholders.*

Cognitively



Prepared

Select and prepare individuals to make effective decisions in challenging operational conditions?

Select and prepare adaptive and resilient individuals to perform effectively in challenging operational conditions?

Prepare teams to operate effectively in challenging operational conditions?

Deliver effective, affordable, training and feedback tailored to the learning opportunities of individuals within teams?

Achieve tailored training outcomes through the application of immersive technology and tools?

Make use of synthetic teammates to reduce the size of the personnel footprint required for effective collective training?

Augmented

Exploit emerging information systems to reduce cognitive burden and enhance performance in challenging operational conditions?

Mitigate the performance decrements of personnel on sustained operations?

Exploit wearable technologies to enhance and track cognitive performance and behaviours?

Team personnel with autonomous systems to increase combat effectiveness?

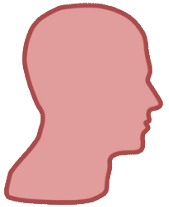
Enhance cognitive performance through nutrition and supplementation?

Make sense from complex information from multiple sources of variable reliability to inform military decision making?

Increase the capacity for accurate and timely decision making by distributing the load across and team and software agents?

Overcome battlefield deception and uncertainty and apply them for military advantage?

Physically



Prepared

Select and prepare personnel to be physically resilient for roles conducted in challenging operational conditions?

Exploit emerging methods to optimise the physical performance in challenging operational conditions?

Optimise nutrition and feeding systems to enhance performance in challenging operational conditions?

Augmented

Reduce the physical burden on combatants through emerging technologies?

Continually develop and improve platforms, individual equipment & clothing to survive and thrive on operations?

Exploit wearable systems to enhance and monitor physical performance?

Exploit emerging food and drug technologies for the enhancement of physical performance and resilience?

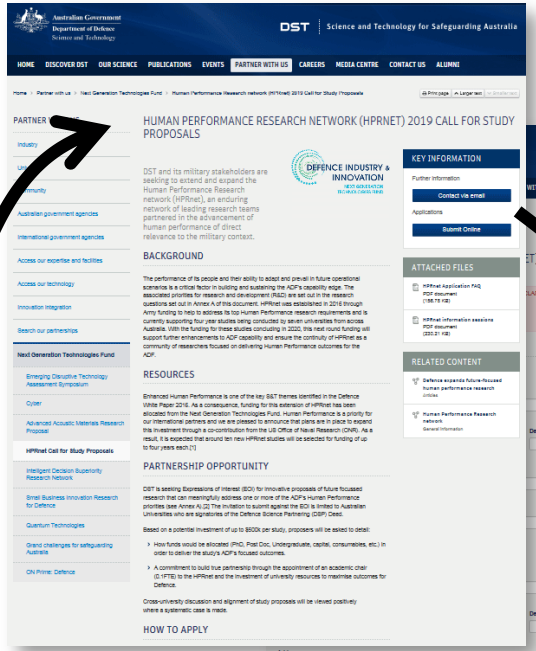
Exploit emerging bio-enhancement technologies for the optimisation of physical performance and resilience?

HPRnet Applications

Google

HPRNET CDIC

https://www.business.gov.au/Centre-for-Defence-Industry-Capability/Defence-Innovation/Next-Generation-Technologies-Fund/Current-opportunities-Next-Gen-Tech-Fund/Defence-expanding-future-focused-human-performance-research



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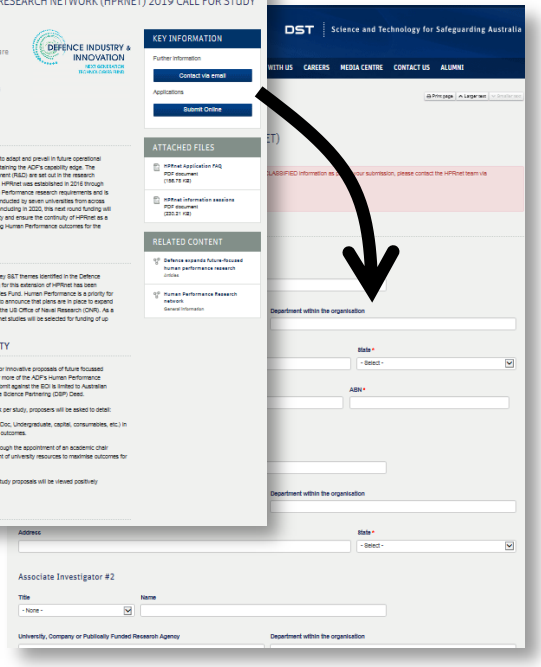

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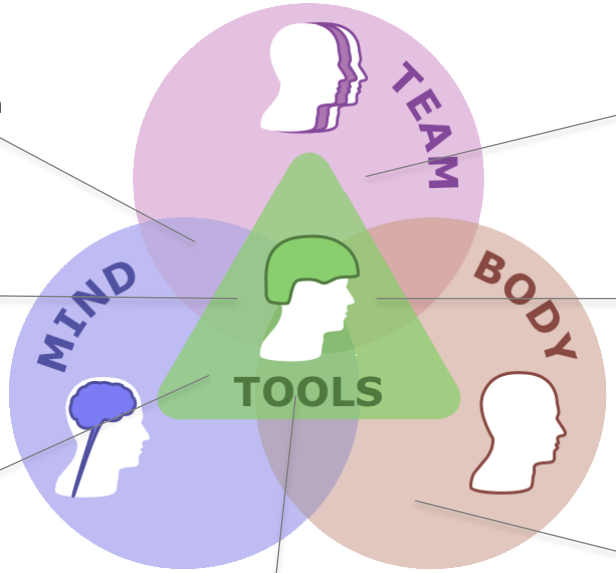
HPRnet

Human Performance Research *network*



Selection, training and intervention strategies to improve warfighter situation awareness

A Dynamic and Temporal Perspective to Optimise Team Resilience

Trusted Human-Autonomy Teaming in Teleoperations

Soldier performance management: monitoring and modelling of load, adaptation and performance

Psychological methods for improving cognitive performance

Combat genes & bioinformatics for physical training

An integrated approach to enhancing cognition and decision-making under stress

Wearable Assistive Technologies : Enhancing the Physical and Physiological Performance of the Dismounted Combatant

Wearable assistive devices support and augment the body's natural physical ability and are rapidly maturing. These devices come in many different forms and range from full body exoskeletons, to joint support and augmentation. DST Group is seeking to build a larger capability in the wearable assistive technology research space to help fast-track the development of this exciting technology, through a partnership with an Australian University

Duration: 3 year program starting FY 19/20

Key work areas: Identify, develop and evaluate assistive technologies that could offer significant potential within Defence other physically demanding industries

Projected timeline: To be released by end of February

DST's Human Performance Program

Selection of current projects

Simulation for Collective Training

Soldier Combat System (SCS) Integration

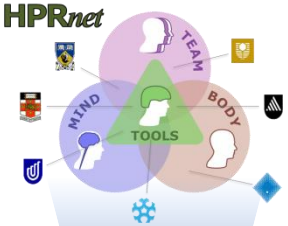
Physical Employment Standards (PES)

Submarine Control Room Design

Microwave Assisted Thermal Sterilisation (MATS)

Tactical Decision Making (Bright Fox)

Next Generation Technologies Fund



Grand Challenges

Defence Cooperative Research Centres

University Research Networks

Strategic Research Program

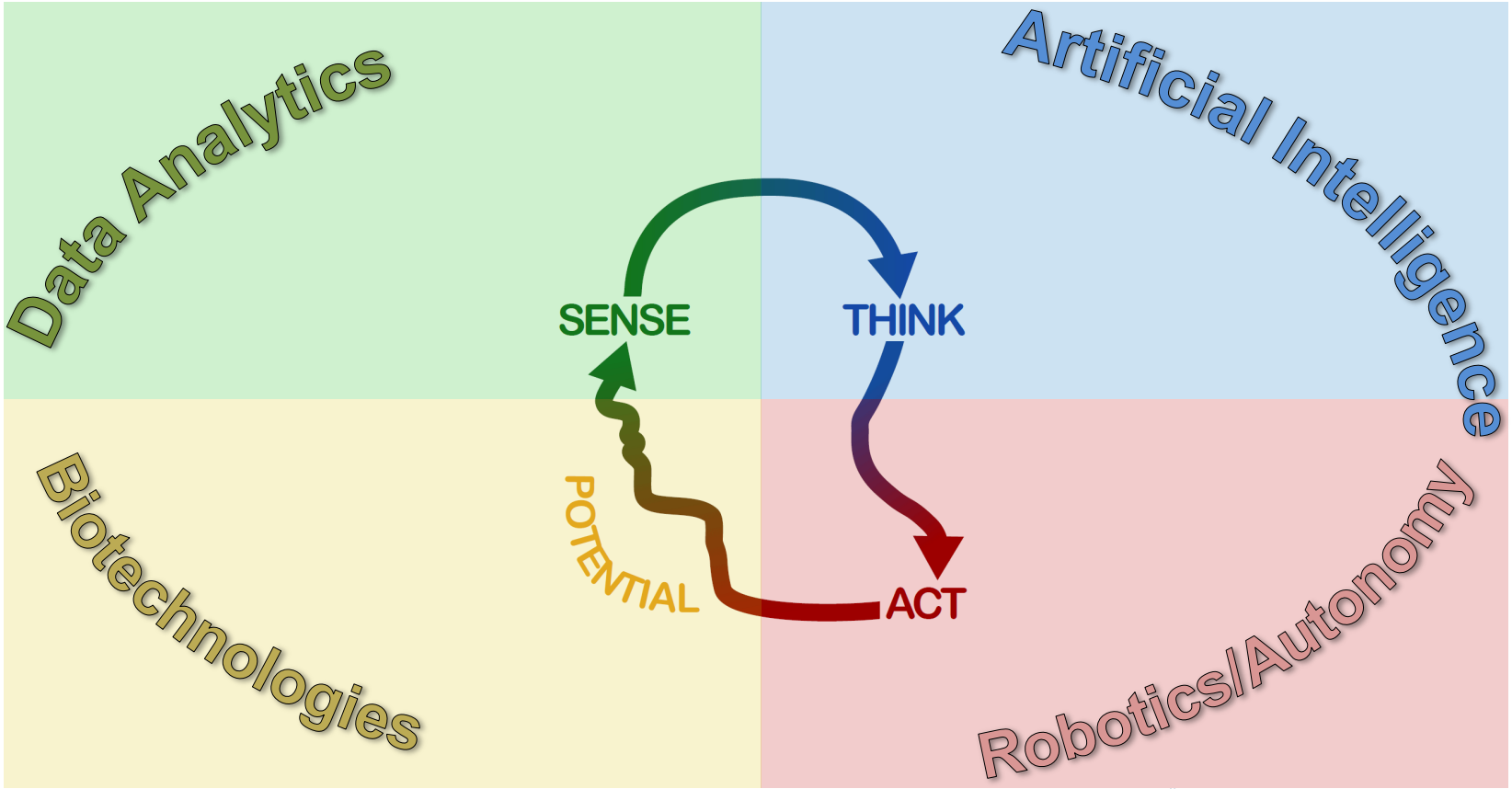
Small Business Innovation Research for Defence

Defence Research Accelerator

Technology Foresighting

AGILITY ACROSS THE PORTFOLIO, INDEPENDENT OF SCALE

Future Horizons



Questions?