



SABRN's 'System-of-Systems' Approach to Combat Health Support



Jan 2025



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Glossary

Term	Definition
E-LifePod	‘Emergency-Surgical-Critical Care’ LifePods (for managing battle injuries)
N-LifePod	‘Non-Emergency’ LifePods (for managing non-battle injuries)
PC-LifePods	‘Patient-Clearance’ LifePods (for casualty evacuation)
S-LifePods	‘Support’ LifePods (for providing logistic support necessary to enable function of E-LifePods & N-LifePods)

A. Background

SABRN is an Australian veteran-founded group of companies developing solutions for healthcare, planetary health, and circular economies.

Founded by Prof. Abhilash Chandra (a General & Vascular surgeon, soldier [25-years in the Australian Army], and academic), SABRN leverages advanced technologies and international collaborations to address pressing global challenges.



SABRN's mission is to improve healthcare delivery in remote, austere, hostile, and overwhelmed environments while championing sustainability and social impact.

SABRN has a strong commitment in developing healthcare resilience and interoperability between Defence and civilian organisations.

SABRN's flagship initiatives are the LifePods. These are compact and modular medical and surgical systems that are designed to enhance casualty evacuation and stabilization. They are domain-agnostic, vehicle-agnostic and scalable.

From the PC-LifePods (for casualty evacuation from combat environments) to the E-LifePods (for pre-hospital, surgical and post-operative critical care provision), these innovations represent a shift from traditional healthcare delivery to a patient-centric, mobile approach.

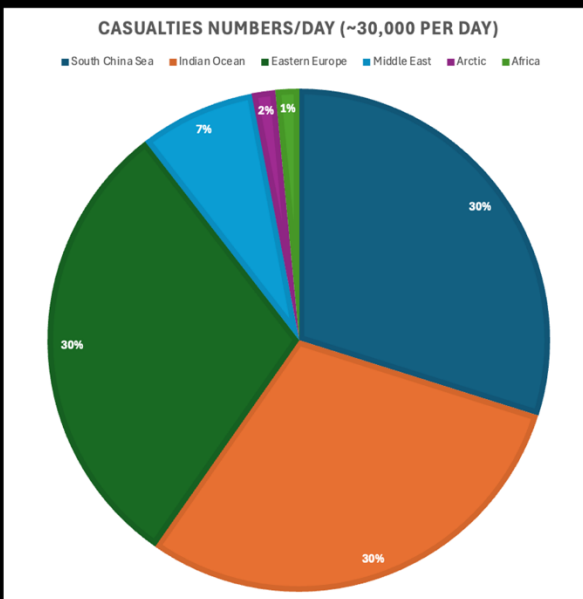
SABRN is also integrating technologies from many international Small & Medium Enterprises (SMEs) to achieve enhanced medical and non-medical capabilities.

Additionally, SABRN has a focus on aligning with global environmental goals by creating circular economies. By integrating healthcare, sustainability, and innovation, SABRN is redefining solutions to complex challenges, fostering impact in defense, industry, and underserved communities worldwide.

B 1. Problem #1: War



Estimated regional casualty if WW III occurs



In a World War III scenario:

If conventional warfare:

1,500–11,000 casualties daily.

If limited nuclear warfare:

50,000–500,000 casualties daily.

If full-scale nuclear warfare:

Millions of casualties in the first few days, with long-term devastation.

*Extrapolated from WW II numbers

B 2. Problem #2: Climate+

Progression of global warming (now earth is 1.5°C above pre-industrial levels)

↑ Natural & Man-made Disasters

Isolated Rural & Remote Communities

Hazardous Occupations

Overwhelmed Environments

Food & water shortages
→ ↑ conflicts

New diseases

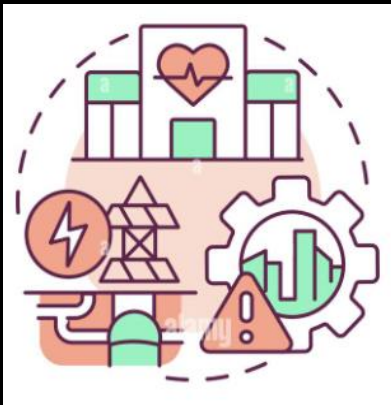


- Climate changes will impact both Defence personnel and civilian populations.
- Consequently, demands on combat & civilian health support will increase significantly.
- Better coordination between combat & civilian health support systems is critical

C 1. SABRN: Purpose

SABRN Goal #1:
Make healthcare available & affordable for all

Multiple capability gaps identified in both
Defence & Civilian Healthcare Systems



A. Insufficient
healthcare
infrastructure



B. Insufficient
frontline
health workers



C. Insufficient
healthcare
specialists

SABRN Approach

- A. Alter the paradigm (take 'hospital-to-patient' model instead of traditional 'patient-to-hospital' approach)
- B. Integrate modern technologies to create a system-of-systems effect within new model, and
- C. Use updated model to complement existing systems

C 2. SABRN: UVP

SABRN's Unique Value Proposition:

SABRN aims to maximize Military-Civilian collaborations to significantly improve patient survival and Return-to-Duty by:

1. Working with combat health support systems to manage battle and non-battle injuries,

&

2. Working with civilian health support systems for people in remote, austere, hostile and overwhelmed environments

C 2. SABRN: Process

SABRN aims to meet these objectives by:

**1. Scaling Number of
Healthcare Infrastructure**

**2. Scaling Impact of
Healthcare Specialists**

**3. Scaling Efficiency of
Frontline Workers**

D. SABRN LifePods

SABRN LifePods will scale healthcare infrastructure because they are:

Compact & Containerized

Expeditionary Medical & Surgical Capabilities

That are integrated with medical and non-medical technologies,

Are de-centralized & geographically unconstrained

And can act as “Mini-mobile field hospitals”

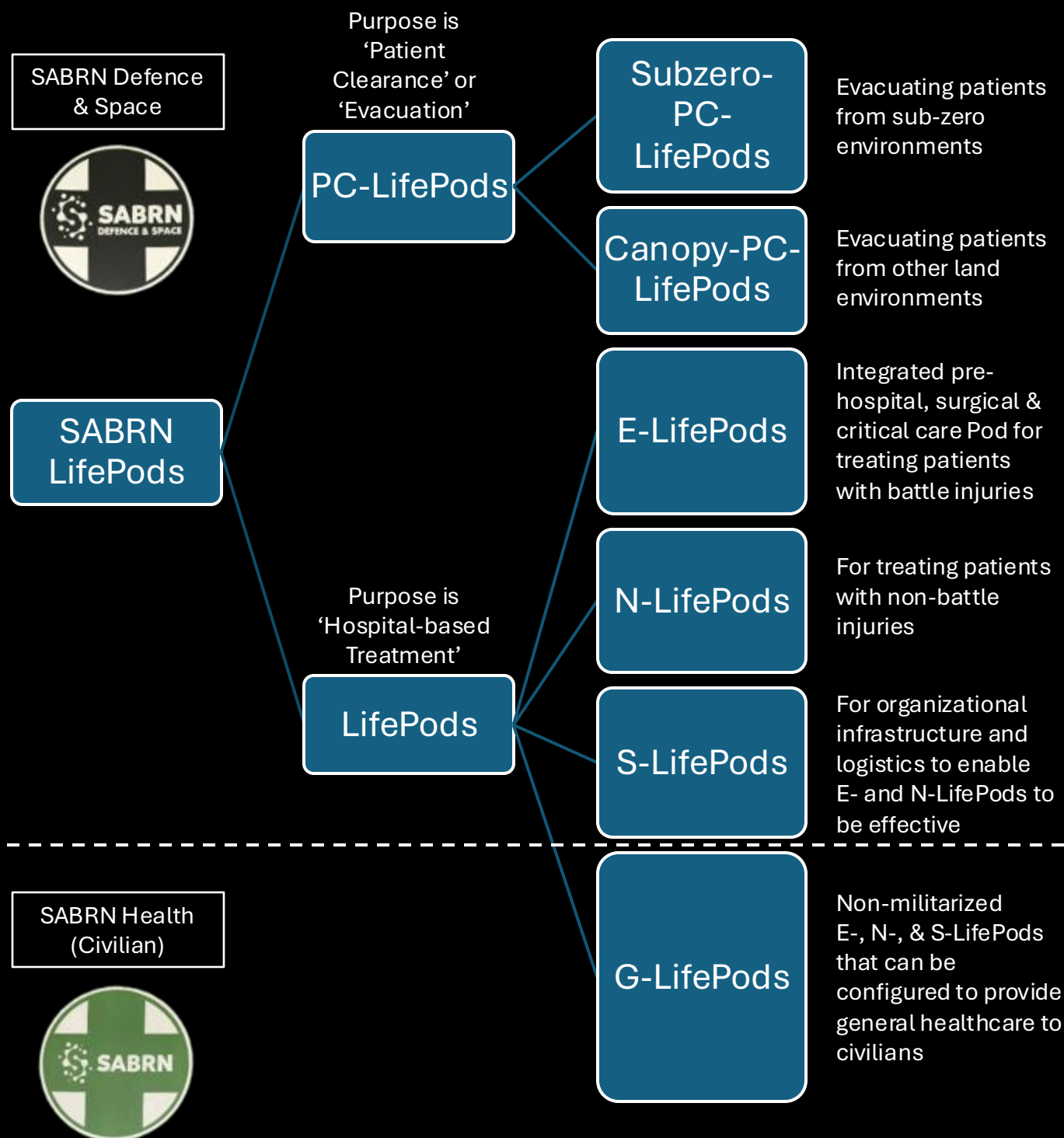


SABRN is building a digitally inter-connected transportable ‘hospital’ with no geographic constraints that can complement current combat and civilian health support capabilities

D. SABRN LifePod Categories

There are two main categories of SABRN LifePods:

1) 'Patient Clearance' Pods & 2) 'Hospital-Based Treatment' Pods



D 1. 'Evacuation' LifePods

'Patient Clearance' PC-LifePods enable casualty evacuation from point-of-injury & creates a 'Bridge' to definitive care

PC-LifePods:

Can be transported by:

1. Uncrewed vehicles (e.g. UGV, UAV, USV, UUV) &/or
2. Crewed vehicles (e.g. snow mobiles, trailers, utes etc.)

Will have on-board

oxygen, monitoring, heat, blood products & communications

Can be sealed & pressurized

Two variants:

- 1) Subzero-PC-LifePods; and
- 2) Canopy-PC-LifePods



D 1a. Subzero-PC-LifePods

Pre-alpha prototype developed in Canberra, Alpha prototype being developed in India

Heavy insulation within walls to ensure $\sim 50^{\circ}\text{C}$ temperature differential

Radioisotope heating unit (RHU) incorporated to maintain battery at operational temperature

Future testing planned in India (Himalayas), and possibly in US, Canada, and Europe

Concept demonstration in Arctic Challenge at Camp Rødsmoen, Norway with USSOCOM & NORSOCOM in Jan 2025

Prototype in development



D 1b. Canopy-PC-LifePods

Alpha prototype currently being built in Brisbane and Canberra, Australia

Every Canopy-PC-LifePod is a “Two-casualty evacuation system” that complements traditional ambulances

Transportable by single-cab pickup truck +/-trailer

One Canopy-PC-LifePod → two-casualty evacuation (pickup or trailer only);

Two Canopy-PC-LifePods → four-casualty evacuation (using both pickup & trailer)

Compatible with civilian and military vehicles

For testing at Ex Talisman Saber 2025 (multi-national military exercise in Australia) in July 2025

D 2. 'Hospital' LifePods

Based around the 'SABRN Cube' design



International Patent
WO 2023/178388 A1

Cuboid = 10-ft x 8-ft x 7-ft

Constant exoskeleton +
Modular endoskeleton
→ interoperable &
→ interchangeable

Three Defence LifePods
based on SABRN Cube:

1. E-LifePods (Emergency)
2. N-LifePods (Non-Emergency)
3. S-LifePods (Support)

One Civilian LifePod based
on SABRN Cube:

1. G-LifePods (General)

D 2a. E-LifePods

“~25% of KIA in Middle-East conflicts were potentially preventable”
Eastridge *et al.* (2012). *J Trauma Acute Care Surg*: 73(6). S5. 431-7



Image is of
pre-alpha
prototype –
scale 1:1

Integrated ED, OT, & ICU

- Pre-hospital capability
- Surgical capability
 - Damage Control Surgery
 - Including Neuro & Ophthalmic
- Critical care capability
 - ~24 hours oxygen
- Bunker-able & transportable

Human & K9 treatment capability

D 2b. N-LifePods

“~25% of active-duty service members have signs of a mental health condition” Kessler *et al.* (2014). *JAMA Psychiatry*. 2014;71(5): 504-513.



Image is of pre-alpha prototype – scale 1:1

For Disease & Non-Battle Injuries (to maximize Return-To-Duty & War-Fighting Capability)



Multiple variants:

Medical	Dental	Allied Health	Mental Health
<ul style="list-style-type: none"> •RAP, Consulting room, Isolation for infectious agents, Ward capacity 		<ul style="list-style-type: none"> •Physiotherapy, Rehabilitation, Occupational therapy 	<ul style="list-style-type: none"> •Psychological therapy

D 2c. S-LifePods

Enables E-LifePods and N-LifePods by providing the logistics infrastructure

Integrates with military logistics

Multiple variants:

- C5
- Supply chain management
- Waste management
- Auxillary power
- Water purification
- 3D printing





D 3. G-LifePods

Based on configurations of SABRN Cubes (one, two, three, four or more Cubes to make G-LifePods)

Non-militarized LifePods but other components same

Supports people from remote, austere, hostile, and overwhelmed environments

Multiple variants:

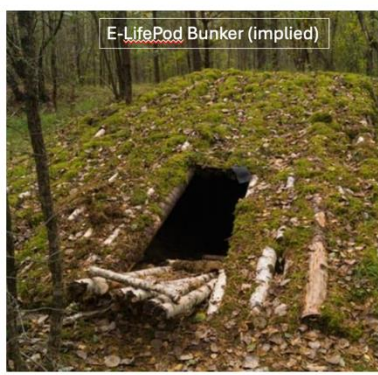
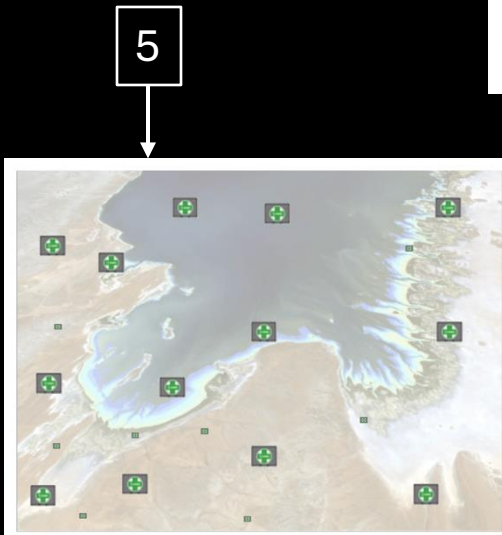
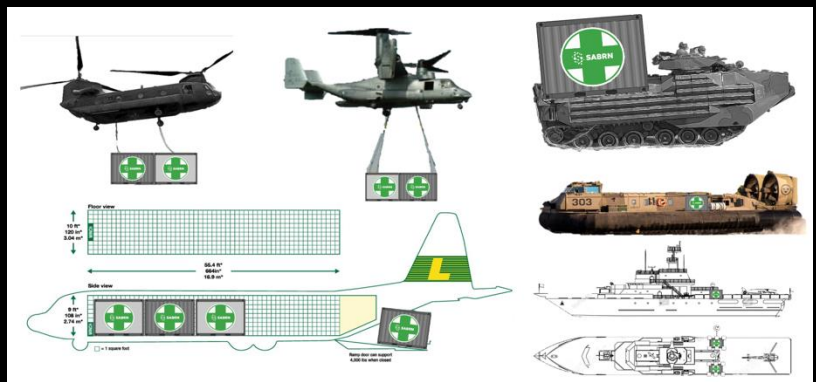
- Assessment
- Diagnostics
- Treatment
- Rehabilitation
- Chemotherapy
- Dialysis etc.



(portrayal of how a G-LifePod configuration with non-militarized E-, N-, and S-LifePods might look)

D 4. Objectives: Non-Clinical

- 1. Compact
- 2. Scalable
- 3. Domain-agnostic
- 4. Vehicle-agnostic
- 5. Geographically unconstrained
- 6. Bunker



D 5. Objectives: Clinical

1. Air decontamination (surgical sterility)

2. Surface decontamination

3. Counter-biological & chemical agents

4. Enhanced diagnostics

5. HL7-FHIR compliant Electronic Medical Records

- E-LifePod internal volume: 16 m³
- Total number of Air Changes per Hour (ACH): 20
- Laminar flow @ operating table
- Air velocity on the operating table: ~0.25 m/s (0.13 to 0.18 m/s)

- ✓ Airborne Bacteriological Class <10 CFU/m³
- ✓ ISO Particulate Cleanliness Class ISO7 | ISO8
- ✓ Particulate Matter Removal Kinetics 90% Filtration 5 min, 99% Filtration 12 min

CFU = Colony Forming Units

1

Blue light technology

- Ambulances
- Aeroplanes
- Defence

Reduces cross-contamination between patients

E-LifePods & PC-LifePods

2



Unit details LifePod details Clinician details

5

Patient details

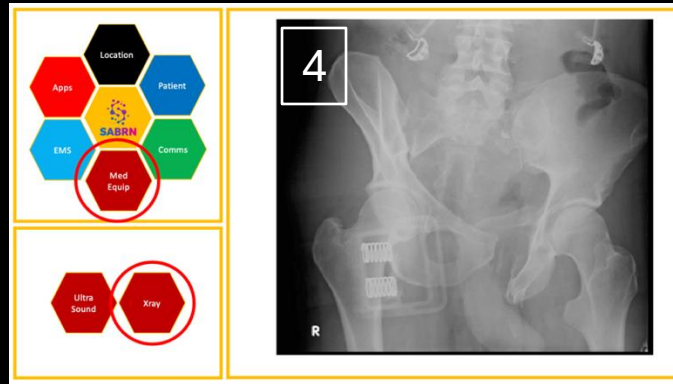
D 6. Objectives: Defence

1. Soft wall EM & thermal cloaking

2. EM signature deception (spoofing)

3. Enhanced logistics with QR Code, RFID & GeoJSON mapping

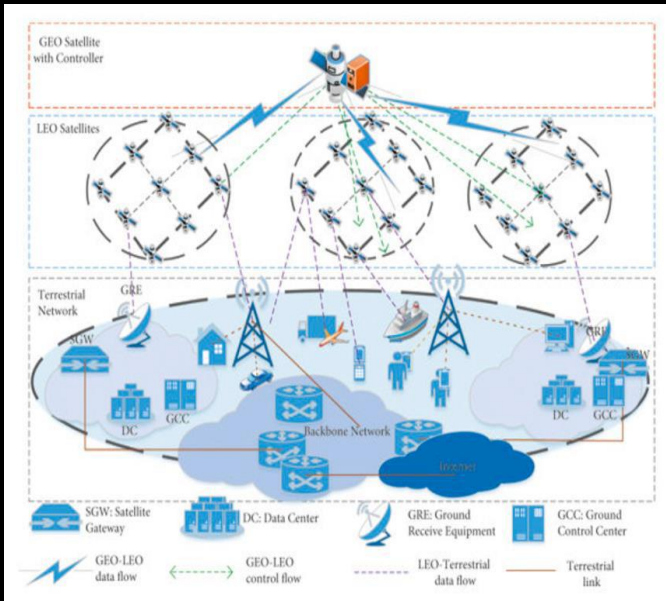
4. Language-agnostic dashboard



Enables 'just-in-time' delivery of resources to remote & austere locations using RFID/Bar coding/QR Coding and GeoJSON format for mapping Geospatial data

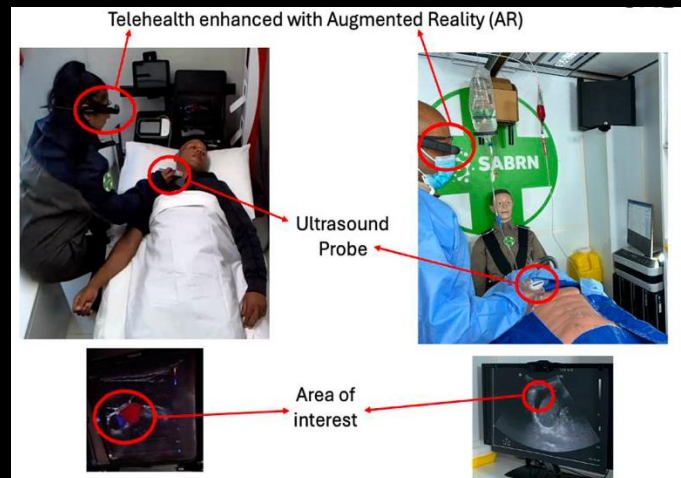
E. Scaling Specialists

Communication Resilience (LEO, MEO, GEO satellites)



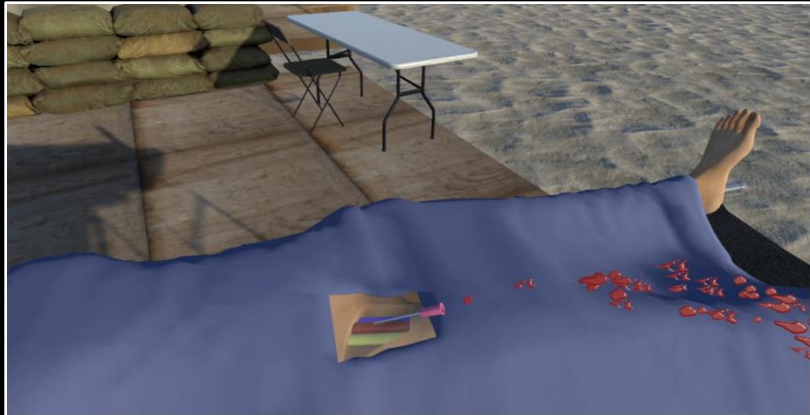
Two-way telementoring in a graded system:

1. Low-power two-way messaging (9-liners)
2. Audio-only
3. Audio & Video
4. Merged-reality enhanced audio-video



F. Scaling Frontline Workers

‘Just-in-time’ & ‘just-in-case’ training with Virtual Reality, Augmented Reality, and 3D-printed surgical mannequins



VR headset



- Cheap & accessible
- Training under stress
- Deep Reinforcement Learning principles
- Novel use of ‘cartridges’
- Rehearsals & tactile/haptic feedback
- Formative & summative assessments



G. Progress To Date

In Australia:

- 25 years with Army (+)
- Part of Defence Trailblazer
- Recipient of Spitfire Memorial Defence Fellowship 25
- Subzero-PC-LifePod **pre-alpha prototype** build in Canberra
- E-LifePod **pre-alpha prototype** build in Canberra
- Canopy-PC-LifePod **alpha prototype** build in Canberra

In US:

- Part of Austrade delegations to SAS 23, AUSA 23, MDM 24, SOF Week 24
- Strong association with Brooke Army Medical Centre
- Several engagement with JTS & MedCDID
- Currently in process of establishing SABRN USA

In India:

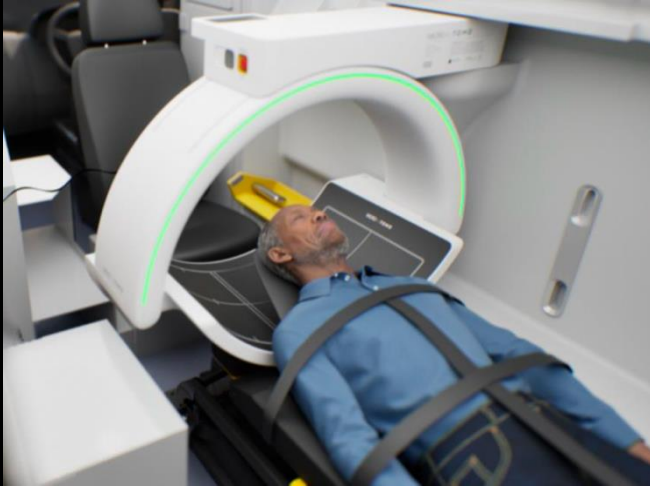
- Presentations at Bengaluru Space Congress 22 & 24, India Space Congress 23 & 24, G20 Space Economy Leaders Forum
- Attended Def-Sat 24 & 25
- Engagements with DG of Indian Armed Forces Medical Services
- Subzero-PC-LifePod **Alpha prototype** build in Delhi
- E-LifePod **alpha prototype** build to be in Hyderabad
- Associations with T-Hub & TASL for manufacturing
- Currently in process of establishing SABRN India

In UK & Europe:

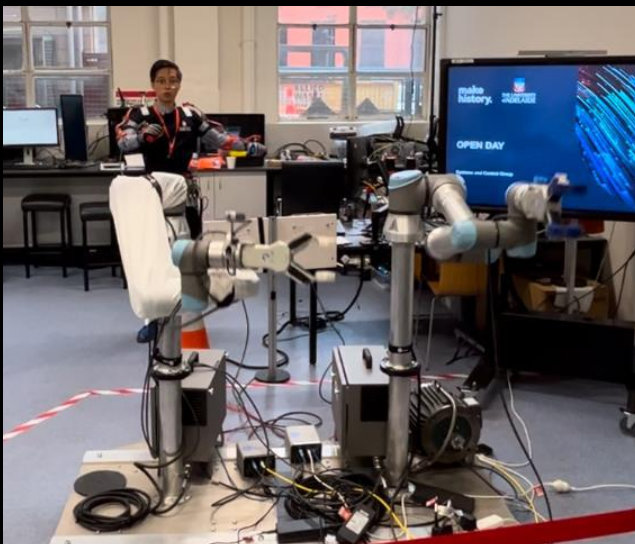
- Established SABRN UK at University of Warwick Innovation Centre
- Attended Eurosatory 24 and attending International Armed Vehicles 25

H. Future R&D

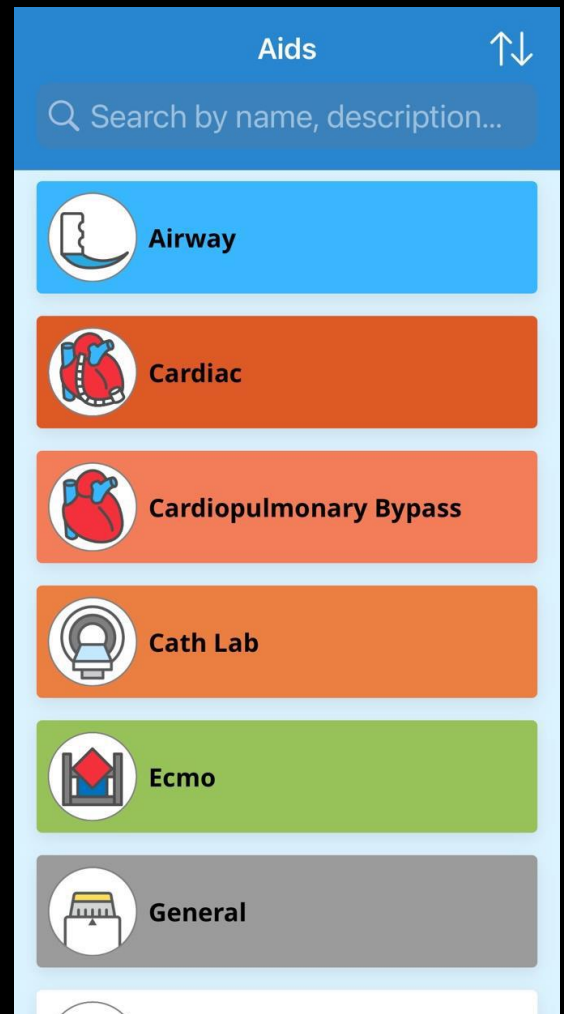
Advanced diagnostics



Incorporating robotics
(including human-
dependent & possibly
human-independent
robotic surgery



Offline AI assistance
for frontline health
workers



Healthcare provision
on extra-terrestrial
environments

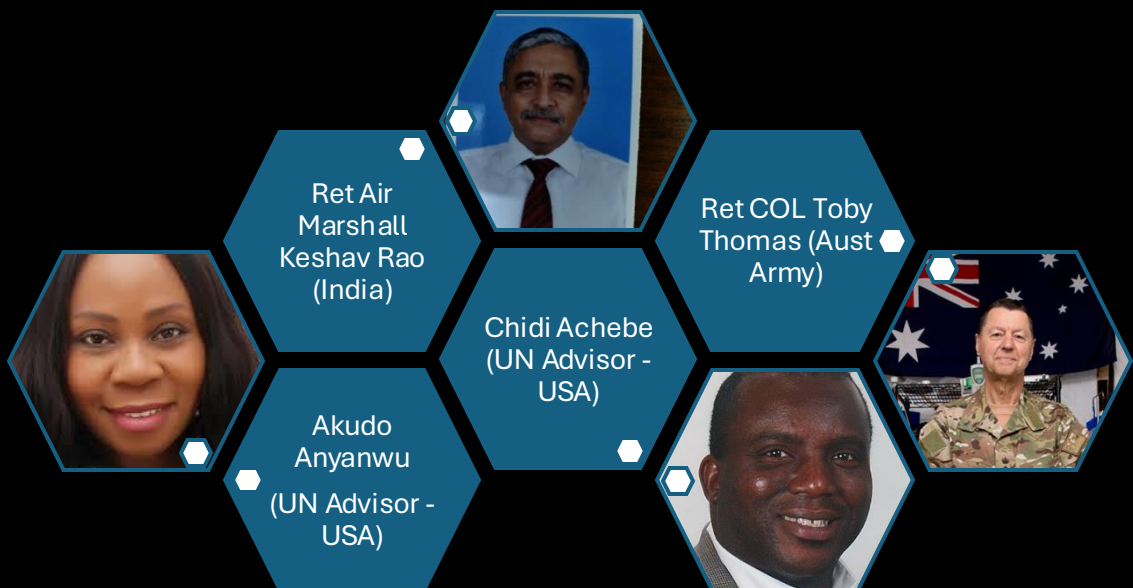
I. Development Roadmap



J. Executive Team



K. Advisory Team



L. Collaborators



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