SABRN's 'System-of-Systems' Approach to Health Support for the Underserved Communities

Mar 2025

Contents

Glossary

Term	Definition
AUSA 23	Association of the US Army 2023
BAMC	Brooke Army Medical Centre
BSX	Bengaluru Space Expo
DG(I)AFMS	Director General of the Indian Armed Forces Medical Services
DIU	Defence Innovation Unit
E-LifePod	'Emergency-Surgical-Critical Care' LifePods (for managing battle injuries)
EM	Electromagnetic
G-LifePods	'General Purpose' LifePods (non-militarized LifePods for civilian health support)
HL7-FHIR	Health Level 7 - Fast Healthcare Interoperability Resources
IAV 25	International Armed Vehicles 2025
ISC	India Space Congress 2023 & 2024
Chief of JTS	Chief of the Joint Trauma System
MedCDID	Medical Capabilities Development & Integration Directorate
MDM 24	Modern Day Marines 2024
N-LifePod	'Non-Emergency' LifePods (for managing non-battle injuries)

Term	Definition
NORSOCOM	Norwegian Special Operations Command
NSWC	Navy Special Warfare Command
PC-Pods	'Patient-Clearance' Pods (for casualty evacuation)
PC-Pods	'Patient-Clearance' Pods (for casualty evacuation)
RAP	Regimental Aid Post
RFID	Radio-Frequency Identification
RHU	Radioisotope Heating Unit
S-LifePods	'Support' LifePods (for providing logistic support necessary to enable function of E-LifePods & N-LifePods)
SAS 23	Sea Air Space 2023
SME	Small & Medium Enterprise
SOF Week 24	Special Operations Forces Week 2024
SXSW 25	South by South West 2025
TAMU	Texas Agricultural & Manufacturing University
TLR	Technology Readiness Levels
USASOC	US Army Special Operations Command

A. Background

SABRN USA Inc, SABRN UK Ltd, and SABRN Health India are operational subsidiaries of SABRN, an Australian veteran-founded group of companies developing solutions for healthcare and planetary health. These SABRN subsidiaries have a focus on providing health support for our uniformed service personnel as well as our civilian population.

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

SABRN's mission is to make healthcare available and affordable to all underserved people around the world, especially those in remote, austere, hostile, overwhelmed and combat environments.

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

SABRN's flagship initiatives are the patented medical and surgical Pods that are compact and modular systems designed to enhance casualty evacuation and stabilization. They are domain-agnostic, vehicle-agnostic and scalable, making them more effective in natural and man-made disasters.

From the PC-Pods (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: Climate

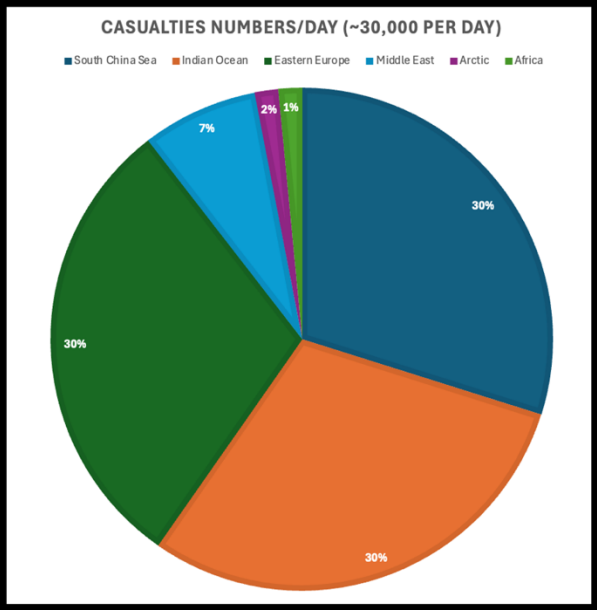
- Progression of global warming (now earth is 1.5ºC above pre-industrial levels)
- ↑ Natural & Man-made Disasters
- Isolated Rural & Remote Communities
- Hazardous Occupations
- Overwhelmed Environments
- Food & water shortages → ↑ conflicts
- New diseases

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

B 1. Problem #1: War

Considerable risk of CBRN conflict

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 3. Problem #3: MIL-CIV Coop

Need For Civilian-Military Cooperation, Coordination And Coexistence In Healthcare Delivery During Peace & Conflict

- Current Concerns
  - Insufficient surge capacity & capability
  - Lack of integrated planning
  - No unified incident command structures
  - Legal, ethical & policy barriers
  - Logistics limitations
  - Medical evacuation bottlenecks
  - Personnel shortages
  - Training gaps
  - Supply chain fragility
  - Public perception
  - Political hesitation
  - Inadequate use of innovation & technology

C 1. SABRN: Purpose

SABRN Goal:
Make healthcare available & affordable for all underserved communities & people

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 significantly improve Patient Survival and accelerate Patient Recovery by:

1. Closing the gap between injury and intervention for stabilisation and life-saving interventions as close to the point of injury,

&

2. Incorporating preventative health protocols for chronic disease and non-communicable disease management

C 2. SABRN: Process

SABRN aims to meet these objectives by taking a 'system-of-systems' approach:

1. Scaling Number of Healthcare Infrastructure (with SABRN Pods)

2. Scaling Impact of Healthcare Specialists (with merged-reality telementoring)

3. Scaling Efficiency of Frontline Workers (with immersive technologies)

D. SABRN Pods

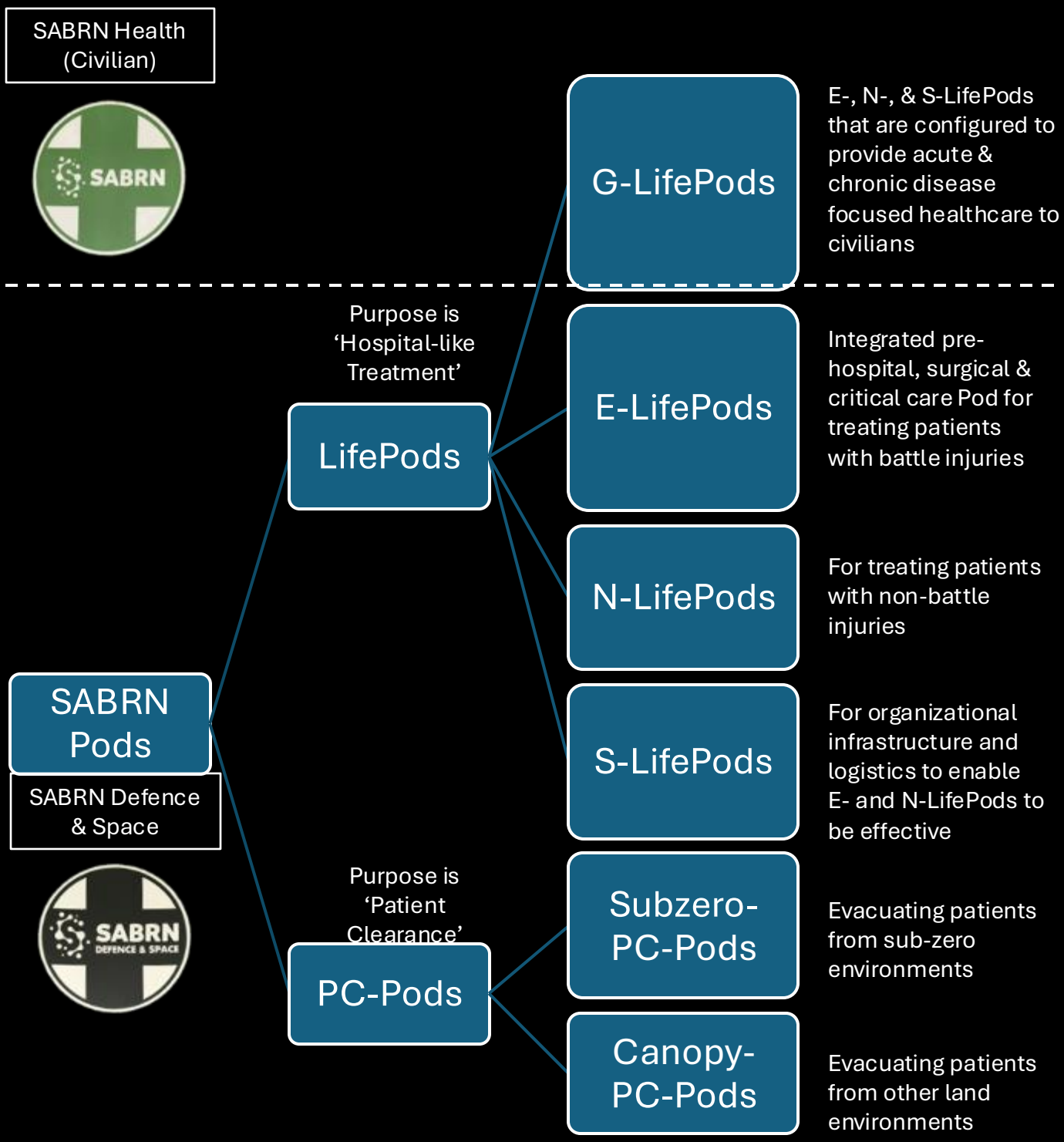
SABRN Pods will scale healthcare infrastructure because they are:

- 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 digitally inter-connected transportable ‘hospitals’ with no geographic constraints that can complement current civilian health support capabilities

D. SABRN Pod Categories

There are two main categories of SABRN Pods:
1) 'Patient Clearance' PC-Pods & 2) 'Hospital-like' LifePods



D 1. ‘Hospital-like’ LifePods

Based around the ‘SABRN Cube’ design

International Patent
WO 2023/178388 A1

Cuboid shape:
10-ft (L) x 8-ft (W) x 7-ft (H)

- Constant exoskeleton
- Modular @ macro and micro-levels
- Interchangeable endoskeleton
- Customizable
- Reinforced

One Civilian LifePod based on SABRN Cube:

1. G-LifePods (General Population)

Three Defence LifePods based on SABRN Cube:

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

D 2. G-LifePods

Non-reinforced ‘General Population’ LifePods

Based around E-, N-, and S-LifePods

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

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

Multiple variants of G-LifePods:

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

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

“Designed for disaster. Built for the planet”
Focus on Sustainability.

D 3a. 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-α 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 3b. 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-α 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
•RAP, Consulting room, Isolation for infectious agents, Ward capacity		•Physiotherapy, Rehabilitation, Occupational therapy	•Psychological therapy

D 3c. 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 4. PC-Pods

‘Patient Clearance’ PC-Pods enable casualty evacuation from point-of-injury & creates a ‘Bridge’ to definitive care

PC-Pods:

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-Pods; & 2) Canopy-PC-Pods	

D 4a. Subzero-PC-Pods

Pre-α prototype developed in Canberra, α-prototype being developed in India

Heavy insulation within walls to ensure ~50°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 25

Opportunity to demonstrate at Arctic Edge in Alaska in 2026

Prototype in development

D 4b. Canopy-PC-Pods

α-prototype currently being built in Brisbane and Canberra, Australia

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

Transportable by single-cab pickup truck +/-trailer

Variants:

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

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

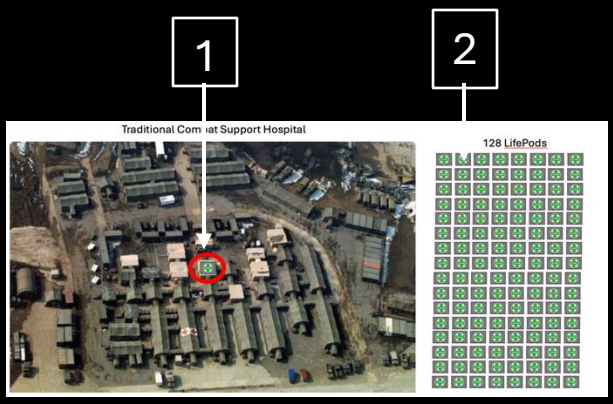
3) ‘Double-decker’-Canopy-PC-Pod → four-casualty evacuation (includes possibility of UAV to evacuate uppermost Canopy-PC-Pod)

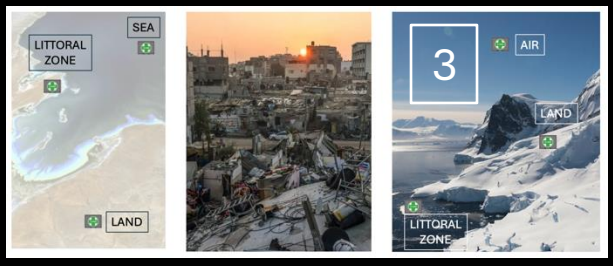
Compatible with civilian and military vehicles

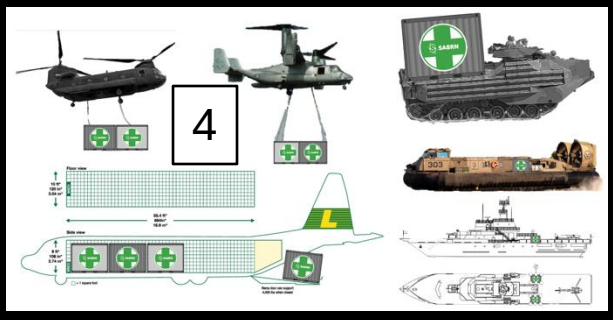
Opportunity to test at Ex Talisman Saber 2025 (multi-national military exercise in Australia) in July 2025 by 3rd-Health Battalion

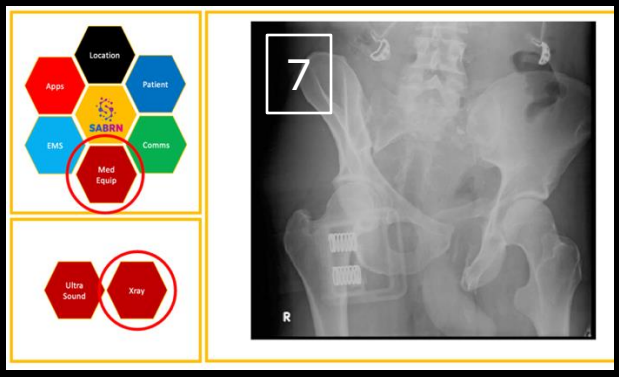
D 5. Objectives: Non-Clinical

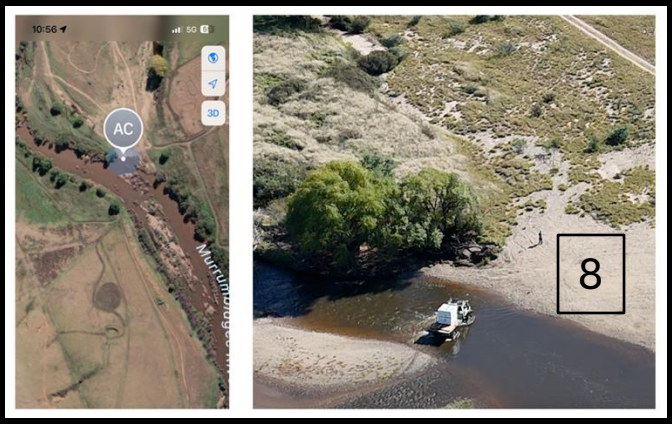
1. Compact
2. Scalable
3. Domain-agnostic
4. Vehicle-agnostic
5. Geographically unconstrained
6. Bunker
7. Language-agnostic dashboard
8. Enhanced logistics with QR Code, RFID & GeoJSON mapping











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

D 6. Objectives: Clinical

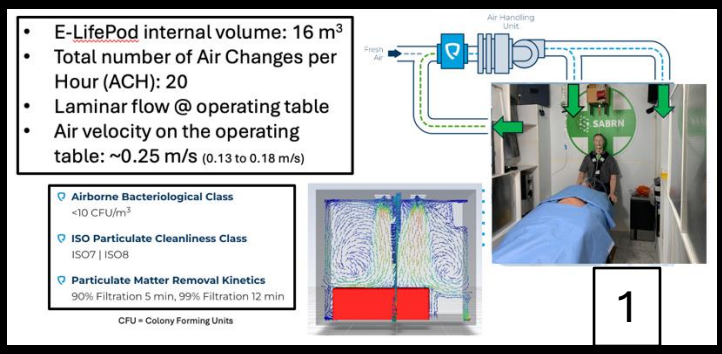
1. Air decontamination (surgical sterility)

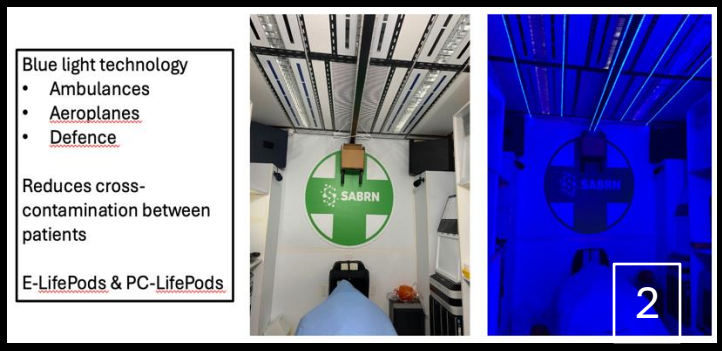
2. Surface decontamination

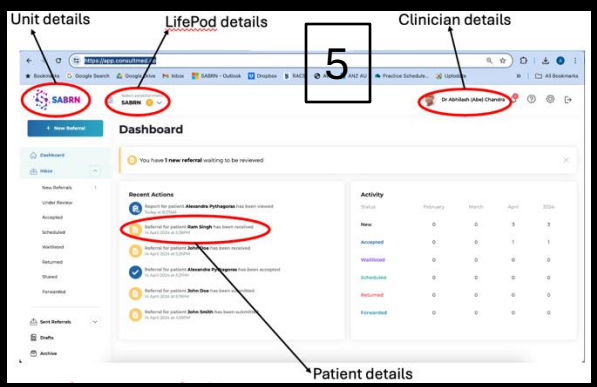
3. Counter-biological, chemical, nuclear & radiological threats

4. Enhanced diagnostics

5. HL7-FHIR compliant Electronic Medical Records

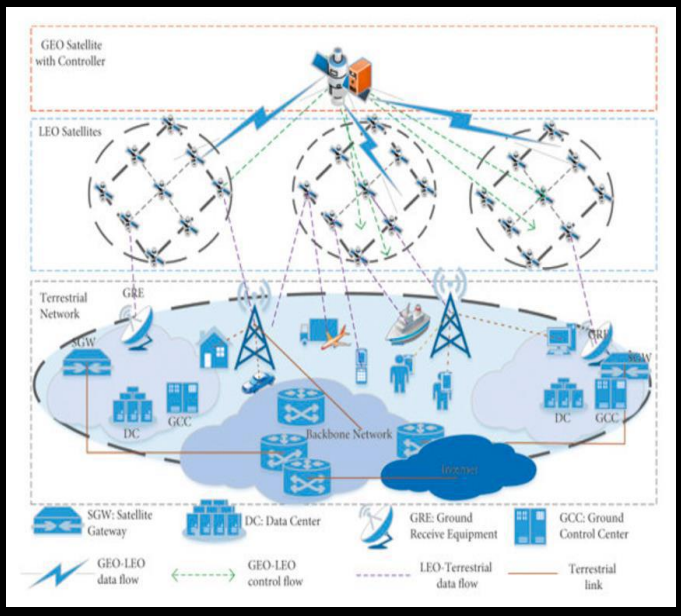






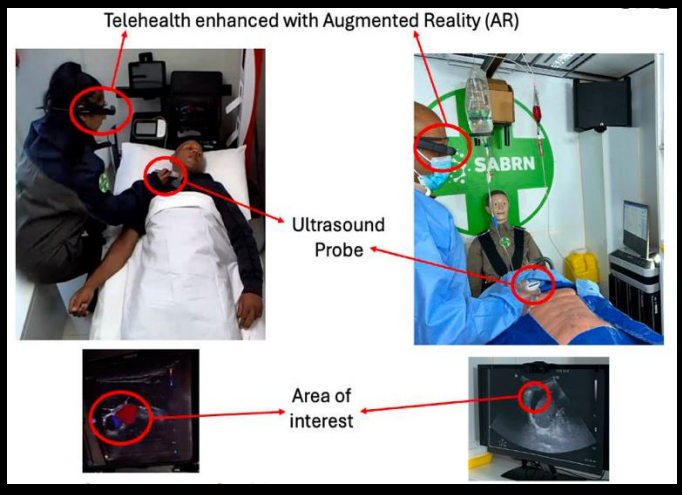
E. Scaling Specialists

Communication Resilience (LEO, MEO, GEO satellites)



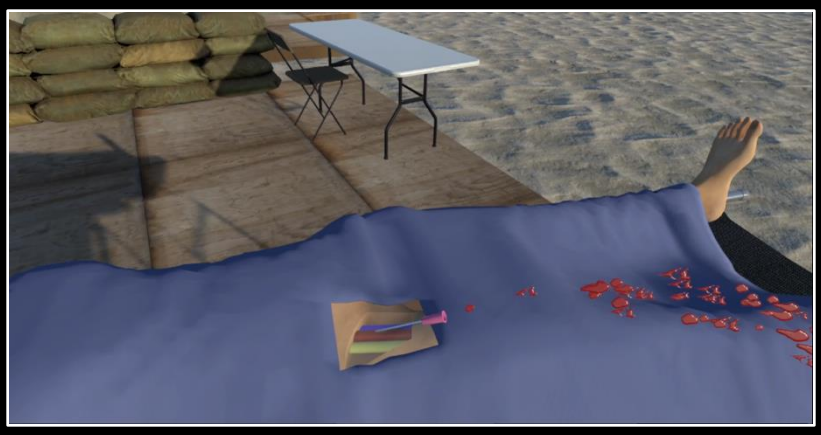
Two-way telementoring in a graded system:

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



F. Scaling Frontline Workers

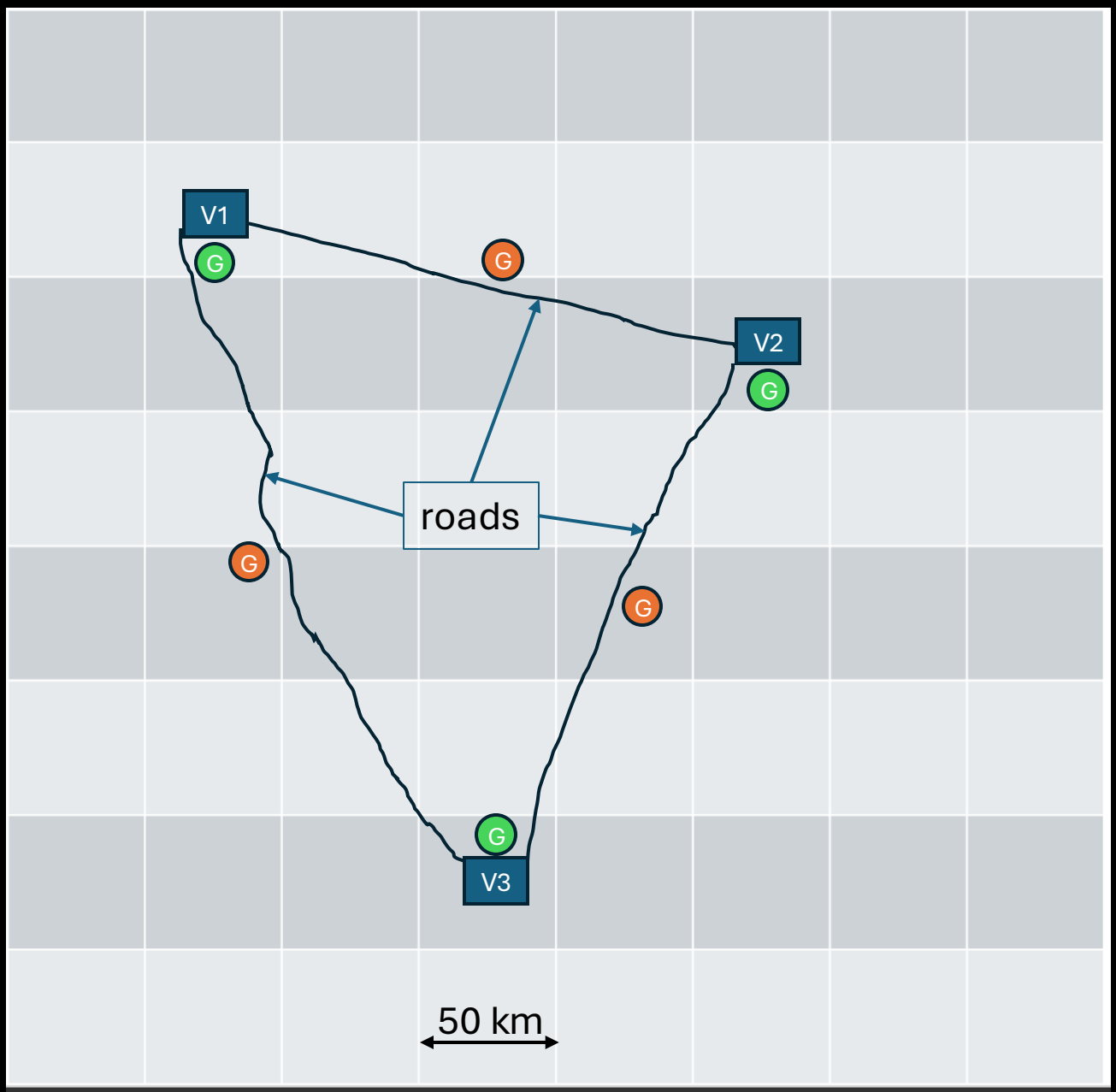
‘Just-in-time’ & ‘just-in-case’ training with Virtual Reality, Augmented Reality, and 3D-printed surgical mannequins



VR headset

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

G. Concept of Operations



V — Village

G — G-LifePod (chronic health focus)

G — G-LifePods (road-trauma focus)

H. Progress To Date

In Australia:
- 25 years with Army (+)
- Part of Defence Trailblazer
- Recipient of Spitfire Memorial Defence Fellowship 25
- Subzero-PC-Pod **pre-α–prototype** build in Canberra
- Canopy-PC-Pod **α–prototype build** in Canberra
- E-LifePod **pre-α–prototype build** in Canberra
- Opportunity to test Canopy-PC-Pod at Ex Talisman Saber 2025

In India:
- Presentations at BSX 22 & 24, ISC 23 & 24, G20 Space Leaders Forum
- Attended Def-Sat 24 & 25
- Engagements with DG(I)AFMS
- Subzero-PC-Pod **α–prototype build** in Delhi
- E-LifePod **α-prototype build** to be in Hyderabad
- Associations with T-Hub & T-Works for manufacturing
- Established SABRN Health India

In UK & Europe:
- Established SABRN UK at University of Warwick Innovation Centre
- Attended Eurosartory 24 and IAV 25
- Attending Deployed Medical & Healthcare Delivery Conference

In US:
- Part of Austrade delegations to SAS 23, AUSA 23, MDM 24, SOF Week 24
- Strong association with BAMC & TAMU
- Several engagement with JTS & MedCDID
- SABRN USA established
- Attending SXSW DIU Capital Factory 25

I. Traction

Feedback from USSOCOM Technical Experimentation 25-1 Arctic Experimentation for SABRN (by 4 different assessors):

- [Navy Special Warfare Command (NSWC)]: The **LifePods by SABRN Tech could represent a significant leap forward** in personal shelter and **life support technology**, offering **unmatched versatility and durability for use in extreme and high-risk environments**. With applications spanning military and disaster relief these pods could provide comprehensive support systems that ensure the safety and comfort of users in some of the most challenging conditions. While the technology is early TRL 3, ongoing innovation in energy efficiency, portability, and sustainability could further enhance the performance and long-term applicability of the Life Pods.

- [US Army Special Operations Command (USASOC)]: System appears tailored to military use. However, possible value in civil/natural disaster response. **Recommend further discussion with DoD experts**.

- [US Army Special Operations Command (USASOC)]: The developer is not currently working with the US DoD on the technology. Due to its ability to support partner forces and soldiers in austere environments I believe **USSOCOM should take a deeper look at the technology's applicability to the modern battlefield**.

- [US Army Special Operations Command (USASOC)]: **This product would be useful to a forward surgical team**.

J. Development Roadmap

Pre-2024

- Trademark approved
- Patent filed
- Pre-alpha prototypes

2025

- Alpha-prototypes test & adjust
  - Ex Talisman Saber 2025 (Australia)
  - Texas A&M University for US DoD (USA)
  - T-Works for IAFMS (India)
  - University of Warwick for UK MOD (UK)
- Regulatory Requirements

2026

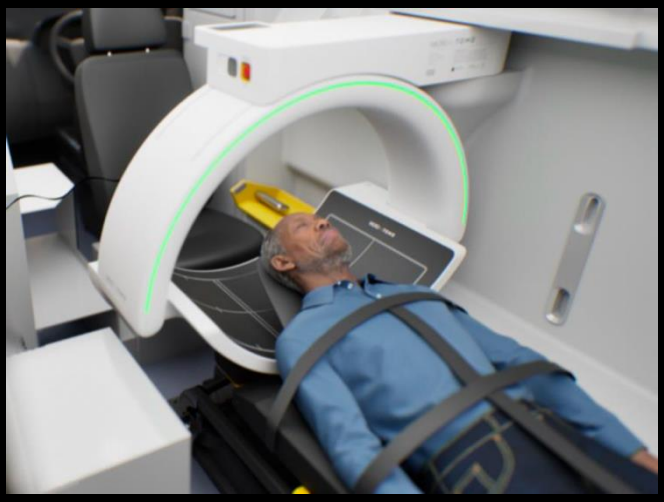
- IP-licensing
- ISO Certification
- Commercialization

2027+

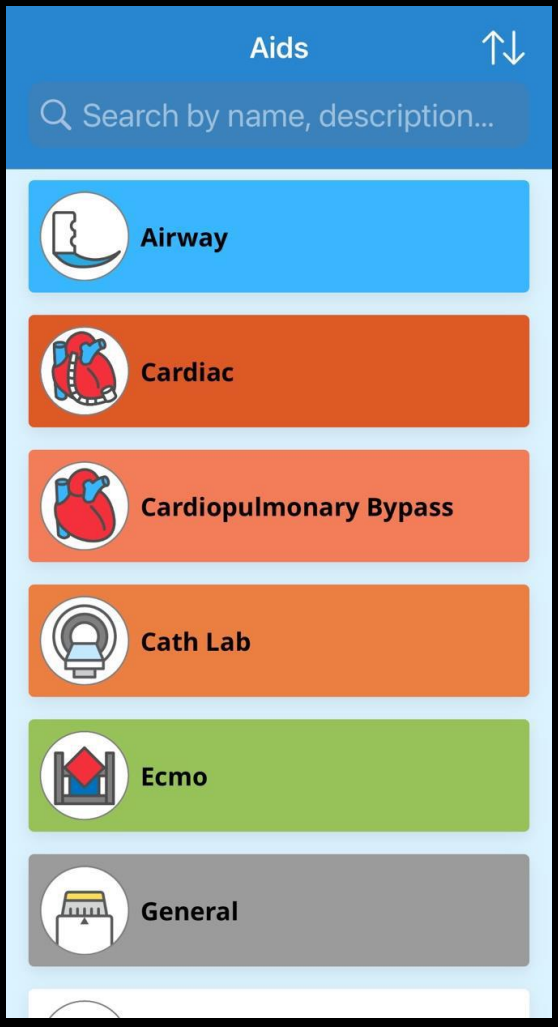
- Scale
- Export

K. Future R&D

Advanced diagnostics



Offline AI assistance for frontline health workers

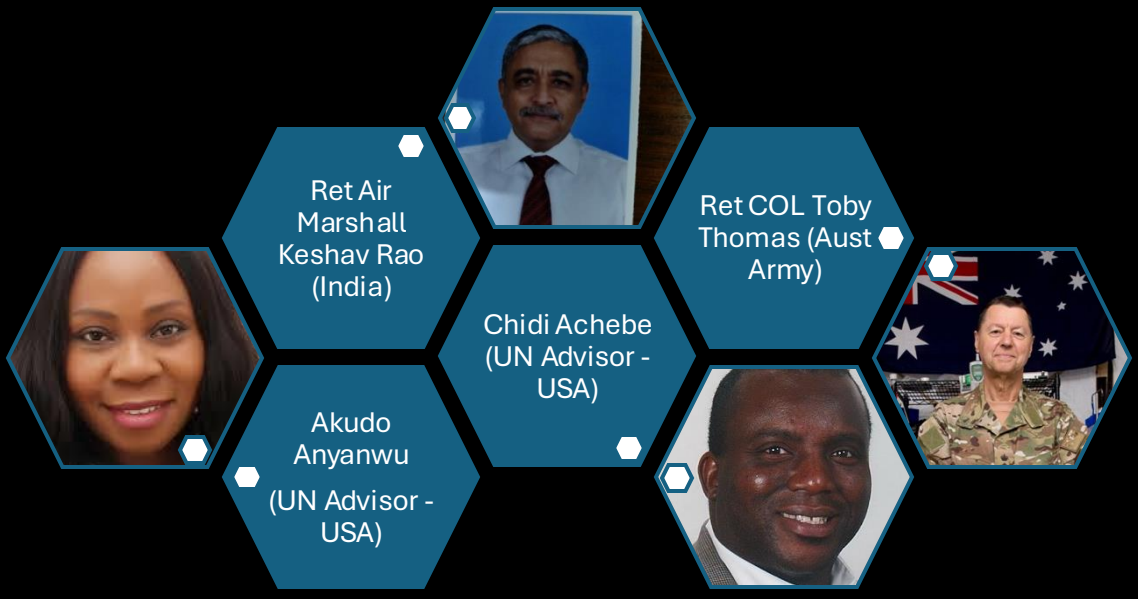


Incorporating robotics (including human-dependent & possibly human-independent robotic surgery

Healthcare provision on extra-terrestrial environments

L. Executive Team

M. Advisory Team



N. Collaborators

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