

LIFEBOT INC. | PUBLIC EDITION 1.2.1

Complete casebook

Collected publications with linked chapter navigation

9 September 2026 | LifeBot Public Release Set v1.3.1

Use this book for continuous reading. The same publications are available separately in the document index, with their own identities and editions. This collection preserves the scope and qualifications of each component; it does not turn historical evidence into a current-product validation.

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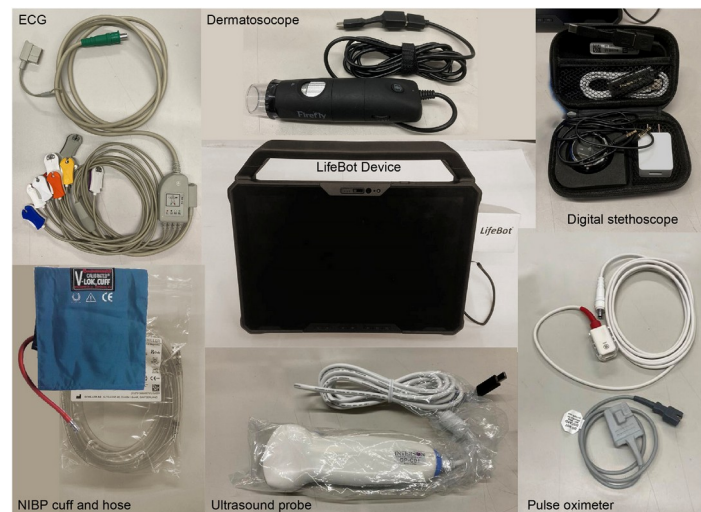
LIFEBOT / DREAMS | VOLUME 01 | PUBLIC EDITION 1.2

NASA ground evaluations

LifeBot 10 in the development of exploration medical capability

PUBLIC SOURCES [NASA evaluation, 2024](#) | [NASA journal review](#) | [NASA findings, 2025](#)

LifeBot 10 entered NASA's evaluation of integrated medical devices as a system combining physiological monitoring, examination tools, imaging and patient information. The published record places the equipment inside a demanding design question: how can a constrained medical system support a caregiver who may have limited training, limited supplies and delayed access to specialists? [NS01, pp.2–6; NS03, §3.1.2]



LifeBot 10 equipment illustrated in Lewandowski et al., *Frontiers in Space Technologies* (2024), Figure 6, p.8. Original figure reproduced from the supplied article under its CC BY license; DOI 10.3389/frspt.2024.1384457. Historical evaluation configuration.

The case in one paragraph

NASA's 2024 presentation reports LifeBot demonstrations in an 11-day Exploration Atmospheres study and describes successful procedure completion, nominal operation in the chamber and simulator checks before and after exposure. The 2025 evaluation summary adds practical findings about imaging, guidance, software recovery and data integration. Together, these records establish a substantive ground-evaluation case and a clear set of engineering lessons. [NS01, pp.3, 9–15; NS04, Table 1]

Case scope: LifeBot 10 and the historical configurations described by NASA. Ground testing and planned flight activities are identified separately throughout this volume.

The mission problem

Integrating capability when mass, volume, power and specialist access are constrained

Exploration medical planning combines two problems. A medical kit must contain useful diagnostic and treatment capability, and its users must be able to obtain and interpret reliable information within mission constraints. NASA's review describes limits on vehicle resources, resupply, evacuation and immediate ground support. These conditions make the interaction among devices, data, training and clinical decision support central to system design. [NS03, pp.1–3]

Why a multifunction device was evaluated

A multifunction integrated medical device brings several functions into a shared equipment and information environment. NASA's market-survey and trade-study summary identified Tempus Pro and LifeBot 10 as the devices that best met that study's evaluation criteria. The subsequent demonstrations examined whether those commercial capabilities would be useful within Earth-independent medical operations. Selection for evaluation is the documented event; it is not a record of procurement for a flight mission. [NS02, abstract]

Evaluation question	What the NASA work examined
Capability fit	Relationship between integrated functions and lunar / Mars medical requirements.
User performance	Ease of use, confidence, comfort and completion of measurement or imaging procedures.
Clinical usability	Whether measurements and images could support the intended medical work.
Environment	Function and measurement behavior before and after exploration-atmosphere exposure.
Information integration	Connection of device records to a central medical data architecture and support tools.

Operational interpretation

The design opportunity is to reduce the effort needed to move from a clinical question to an interpretable observation. That includes selecting the correct peripheral, acquiring usable data, associating it with the correct person and making it available within the medical workflow. This is an interpretation of the evaluation framework, rather than a measured reduction in crew time. It gives buyers a practical way to assess an integrated system beyond the number of accessories supplied. [NS01, pp.2, 14–15; NS04]

What was demonstrated

HESTIA and the Exploration Atmospheres studies

NASA's Human Exploration System Testbed for Integration and Advancement, HESTIA, is a ground-based hypobaric chamber at Johnson Space Center. The medical-device demonstrations formed part of Exploration Atmospheres work examining alternate atmospheric conditions. LifeBot was demonstrated during the EA-3 11-day study; Tempus Pro demonstrations were associated with EA-2 studies. These are distinct study assignments, not a claim that every device was used in every chamber session. [NS01, p.3; NS03, p.7]

LifeBot measurement and examination functions

The peer-reviewed review specifically lists electrocardiography, non-invasive blood pressure, pulse oximetry, digital stethoscope, dermatoscope and ultrasound imaging among the LifeBot functions demonstrated in HESTIA. The broader 2024 presentation describes additional device capabilities, including end-tidal carbon dioxide and patient-report management. A listed capability and a documented chamber procedure are kept separate in this case study. [NS03, §3.1.2; NS01, p.5]

How users interacted with the system

During science-day sessions, crew members acted as caregivers and patients or performed self-examinations. Some sessions included console support for operational or clinical questions; others were conducted autonomously without that support. User-experience surveys captured observations from caregivers and patients. The participants were generally not medically trained; the presentation identifies one emergency medical technician and states that all held basic lifesaving and first-aid certification. [NS01, pp.9, 12]

Observed performance

The presentation reports that participants completed the procedures and obtained measurements. It also reports nominal operation of both devices in the chamber and continued accurate measurements against a biomedical simulator before and after alternate-atmosphere exposure. These observations support functional operation in the evaluated setting. They do not provide a clinical patient-outcome trial or a complete environmental qualification envelope. [NS01, pp.12–13]

Training was part of the result

Caregivers wanted more familiarization and more help with ultrasound acquisition. This makes the training burden a substantive evaluation finding: an integrated device can consolidate equipment while still requiring skill-specific instruction for particular modalities. [NS01, pp.10–12]

Capability fit, quantified

NASA’s 2024 comparison of the evaluated equipment combinations

Reported measure	LifeBot 10 + defibrillator module	Tempus Pro + Tempus LS
Different capabilities counted	26	29
Lunar foundation capabilities met	17 of 39	17 of 39
Mars list capabilities met	16 of 36	20 of 36
Capabilities on neither list	4	3
Capabilities unique to the device combination	6	8

Source: [NS01](#), slide 8. LDLOLS = Long Duration Lunar Orbit and Lunar Surface. The comparison includes the named defibrillator combinations and the requirement lists used in that presentation.

CAPABILITIES MET BY THE EVALUATED LIFEBOT COMBINATION



LifeBot 10 + defibrillator module • NASA 2024 capability lists

Original chart of the LifeBot combination’s reported capability counts. Counts are unweighted and use different requirement lists; they are not percentages of overall mission readiness. Data: [NS01](#), slide 8.

What the numbers tell a decision maker

LifeBot’s evaluated combination addressed a meaningful subset of the two requirement lists and also offered functions outside those lists. The equal lunar count and differing Mars count show why a device cannot be selected using one headline capability total. The relevance of each function depends on the mission’s medical risk model, the available crew skills and the equipment carried elsewhere in the system.

A requirement count does not measure image quality, reliability over a mission, consumable sufficiency, integration effort or clinical benefit. NASA’s 2025 direction toward customized integration follows this distinction: prioritize functions that reduce medical risk and connect them to the information and guidance needed to use them. [\[NS04, key components and concept formulation\]](#)

Usability and clinical information

Successful acquisition, confidence and the need for better guidance

Caregiver experience

The 2024 presentation describes the devices and peripherals as generally easy for caregivers to use. Participants completed the test procedures and expressed confidence, while also reporting uncertainty about ultrasound image quality. More familiarization was considered useful, particularly for LifeBot. These findings distinguish the ability to finish a task from confidence in the clinical quality of its result. [NS01, pp.10–12]

Patient experience

The reported comfort concerns involved tight blood-pressure cuffs during repeated measurements, cold ultrasound gel and pressure from the ultrasound probe. The presentation discusses these observations across the evaluated devices; it does not supply a LifeBot-specific adverse-event rate. A clear account therefore preserves the qualitative nature of the findings. [NS01, p.10]

Procedural support

LifeBot users relied heavily on written guidance, especially during autonomous sessions. The presentation contrasts this with substantial use of built-in guidance by some Tempus users. The relevant lesson is not that one form of instruction is universally sufficient. Instructions must be available at the point of need, understandable to the intended caregiver and effective for the specific procedure being attempted. [NS01, p.11]

Measurement versus interpretation

The 2024 presentation stated that clinician grading of ultrasound images and evaluation by trained sonographers would be performed during ground studies. The later 2025 poster reports that clinical usability of ultrasound was lower than expected and recommends higher-quality ultrasound capability within customized integration. The later finding belongs in the evaluation story alongside the earlier successful procedure completion. [NS01, p.12; NS04, Table 1 and key components]

Implication for deployable medical capability

A useful evaluation should capture task completion, time, assistance, use error, image adequacy and confidence separately. This is a proposed interpretation for future evaluation design. It avoids allowing a favorable usability impression to stand in for a clinical-quality assessment and gives engineering and training teams different, actionable measures to improve.

The 2025 integration findings

A more specific engineering direction for exploration medical systems

PUBLIC SOURCES [NASA findings, 2025](#)

The 2025 NASA poster, Custom Integration of Multiple Medical Functionalities, summarizes the commercial-device evaluations and introduces the Crew Health and Performance – Integrated Customized Technology concept. Its findings are valuable because they identify both useful capability and the work needed to fit that capability into an exploration medical architecture. [[NS04](#); [NS05](#), document 20250000099]

Topic	Finding reported in the 2025 poster
Vital signs and atmosphere	Both devices produced accurate simulator readings and tolerated exploration-atmosphere exposure.
Imaging and support	Ultrasound clinical usability was lower than expected; users wanted more acquisition and interpretation guidance.
Software behavior	Software issues required some reboots during the evaluations. The summary does not allocate every reboot by device.
LifeBot information interface	The evaluated LifeBot contained an outdated application programming interface.
Reported LifeBot size	Mass 3.9 kg; volume 10.75 L, for the equipment described in the poster.
Customization direction	Risk-based capability selection, adaptable equipment, independent data architecture and integrated guidance.

A useful distinction in the record

The 2024 presentation considered LifeBot potentially better suited to data integration, and the 2024 journal review described opportunities in its more open platform. The 2025 interface finding shows that architectural potential and a usable implementation are different questions. The record supports discussing customization opportunity while retaining the interface condition observed in the assessed equipment. [[NS01](#), p.15; [NS03](#), p.7; [NS04](#)]

The poster specifically associates completed flight certification and cabin depressurization/re-pressurization performance with Tempus Pro. That statement is not transferred to LifeBot. The LifeBot case remains the ground-evaluation record established by the supplied publications. [[NS04](#), Table 1]

What this case establishes

A documented evaluation heritage with practical mission-design value

The NASA record establishes that LifeBot 10 was examined as a multifunction medical-device candidate, used in a ground analog, compared against exploration capability lists and assessed for usability and information integration. Identifying the equipment, setting, questions and reported results gives technical readers a precise basis for assessing this case. [\[NS01–NS05\]](#)

Relevance to LifeBot's system story

The case reinforces the importance of combining medical observation, information capture and remote support in one operational concept. It also shows why the quality of each modality, the availability of guidance and the accessibility of data must remain visible within that concept. For isolated terrestrial operations, the design analogy is the need to continue useful local work when specialist support is delayed. This is an operational interpretation; it is not a finding that the historical NASA equipment and today's LifeBot configurations are identical.

From evaluation to a customer discussion

- Define the medical tasks and the skills of the people expected to perform them.
- Select the monitoring and imaging configuration, then assess the clinical usefulness of its actual outputs.
- Specify how observations enter patient records and how records move into the customer's wider information environment.
- Evaluate instruction, assistance and recovery behavior under the intended communications conditions.

These priorities are derived from the issues addressed in the publications. They provide a practical agenda for discussing a configured solution without presenting a proposed evaluation as an already executed test.

Reference route

Read [NS01](#) for the 2024 demonstration and capability comparison; [NS03](#) for the peer-reviewed description of the LifeBot HESTIA work; and [NS04](#) for the 2025 findings and customization direction. [NS02](#) and [NS05](#) establish the associated bibliographic records. Full titles, dates, links and page locators are in the companion reference volume.

Historical test results remain attached to their evaluated equipment. Current LifeBot product-family information is provided in the separate technical datasheet set, DREAMS version 12.07.15 / build 3.

The supplied 2024 presentation and 2025 poster were read directly. NASA record access was restricted on 9 September 2026. The Source Guide provides locators and the included public-use poster; the original source limitations still apply.

[NASA sources, dates and reading copies](#)

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The DREAMS foundation

A sustained program to connect expertise with care in the field

PUBLIC SOURCES [DREAMS final report, 2006](#) | [Texas A&M program](#)

DREAMS—Disaster Relief and Emergency Medical Services—developed around a clear operational idea: give a remote physician meaningful access to the patient, field team and clinical information before the patient reaches definitive care. The original reports connect that idea to ambulance communications, patient monitoring, software integration, field evaluation and research partnerships. [[D01](#), PDF pp.5–7; [D07](#), PDF pp.2–13]

The early concept

The 2002 program report traces an earlier technical foundation to an ARPA-supported Advanced Fire Protection Technologies project beginning in June 1995 and its emergency information and response management system. A contemporary Texas A&M brochure describes prototype testing in Houston from 1995 and identifies Dr. James “Red” Duke’s clinical vision. These sources explain the formative concept without treating the later commercial product as an unchanged 1995 system. [[D05](#), PDF p.5; [P01](#), PDF pp.3–4]

The research partnership

The early Digital EMS reports identify the University of Texas Health Science Center at Houston and Texas A&M engineering participation. Subsequent work brought together clinicians, emergency medical services, engineering teams and U.S. Army medical research support. The program combined technical development with the practical demands of emergency transport and remote clinical participation. [[D01](#); [D04](#); [D07](#)]

Why this foundation matters

The historical record is unusually useful for explaining the system problem. It contains more than a product concept: it describes interface integration, communications tradeoffs, human factors assessments, staged tests, training and field use. Those subjects remain central to a serious telemedicine deployment even as the underlying hardware, software and networks change.

This volume follows the historical program and its engineering records. The document-set date is September 2026. DREAMS 12.07.15, Build 3 is the source designation; verify the installed software separately.

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Program chronology

From early prototypes to institutional and space-medicine evaluations

PUBLIC SOURCES [1999 report](#) | [2000 report](#) | [2001 report](#) | [2002 report](#)

Period	Documented milestone	Source
1995	Earlier emergency-information prototype work and Houston concept testing	D05 ; P01
1998–1999	Army-supported Digital EMS work on remote physician participation and field systems	D01
2000–2002	Expanded system engineering, communications and human factors documentation	D03–D05
2003–2004	Engineering iterations, external heuristic assessments and volunteer runs	D07
2004–2006	Stable-patient testing, routine trauma-run phase and field expansion	D07
2005	Hurricane-response use in New Orleans and Texas	D07
2012	TCAT/TEES source-distribution documentation and LifeBot design guide	SW02; REF01
2014–2016	Commercial award and Maryland telehealth evaluation reports	REF02 ; MD02–03
2017–2018	Alberta mobile stroke implementation and early cohort publication	AB01
2024–2025	Published NASA ground-device evaluation and integration findings	NS01 ; NS03–05

Read report dates from the report

Several archive filenames use a project year instead of the document's actual report date. The file labelled 1998 is a February 1999 report. The 1999-labelled report is dated October 2000, and the 2000-labelled report is dated October 2001. The two 2002 files contain the same annual report. The reference volume records those distinctions so a timeline does not silently turn filenames into evidence. [[D01](#); [D03–D06](#)]

The chronology identifies documented milestones. It does not assert continuous use of a particular configuration between the listed events.

Program boundaries and sponsors

Understanding the branches of the original research

The DREAMS name appears in a broader body of medical research than the ambulance software alone. The supplied program front matter distinguishes Digital EMS from a Detection and Remediation research effort, with separate teams and resources. Contemporary material also discusses basic clinical science, and the archive contains clinical and STAT reports. [D08, PDF pp.2–4; P01; C01–C04; S00–S06]

Research branch	Role in this collection
Digital EMS	Primary basis for the historical system, operational testing and field-deployment narrative
Detection and remediation	Context for the broader DREAMS research umbrella; not a current LifeBot capability claim
Clinical / STAT research	Companion research context; not software acceptance tests or a telemedicine efficacy trial
Later engineering distribution	Documentation of distributed development materials; not an independently rebuilt current release

Funding and attribution

The early reports identify awards including DAMD17-98-2-8002 and DAMD17-01-2-0054; the broader program front matter identifies DAMD17-00-2-0010. Award identifiers help distinguish the work packages and reporting periods. They should not be combined into an unsupported total investment in the present LifeBot product. [D01; D05; D08]

Texas A&M's institutional DREAMS page describes an Army-supported mobile telemedicine program using video, audio and physiological information to connect field care and remote expertise. It provides an institutional reference for the program's purpose. [WEB-TAMU]

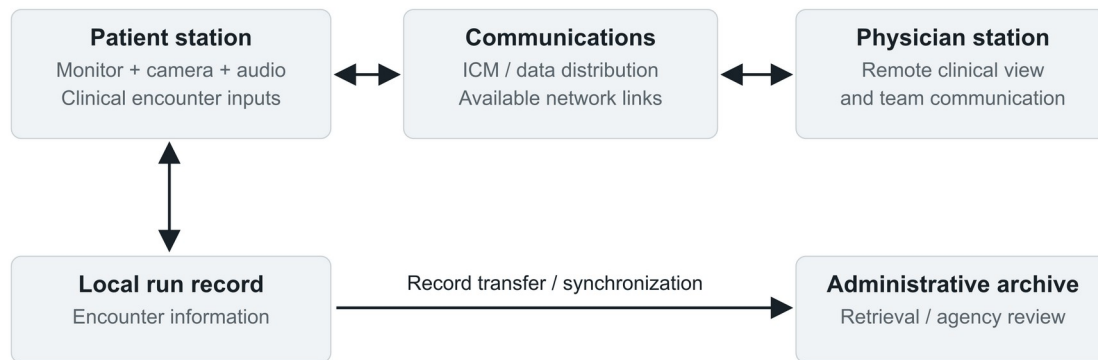
A precise foundation narrative

LifeBot's technical history can be explained through the Digital EMS architecture and documented program operations. Related research contributes context about the research environment. Keeping the branches identifiable lets customers and partners understand the lineage without attributing every DREAMS research result to the commercial telemedicine platform.

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The historical system architecture

Clinical information, communications and records as one workflow



HISTORICAL FUNCTIONAL RELATIONSHIPS • ORIGINAL DREAMS PROGRAM

Original functional diagram based on [D07](#), PDF pp.10–13, and the historical software design document SW01. It describes program-era roles and exchanges; it is not a verified topology of a current installation.

Patient-side integration

The patient station brought together physiological monitor data, camera views, audio, navigation and run-record information. Local inputs included barcode and card readers, signature capture and printing. The clinical information was useful both during the remote interaction and in the subsequent patient-care record. [[D07](#), PDF pp.10–13]

Remote participation and archive

The physician station presented the available clinical streams and supported communication with the field team. The administrative environment stored and retrieved run records for agency use. The design documents describe database and client/server components, including local information handling and synchronization arrangements. [[D07](#), PDF pp.5, 10–13; SW01, opening architecture sections]

Communications as a managed subsystem

The historical Integrated Communications Module coordinated available interfaces and the Data Distribution System handled application data exchange. The program explored multiple communications bearers and made tradeoffs between reliability, bandwidth and media quality. The functional lesson is to manage clinical information across the available link while keeping the field team's local work usable. [[D07](#), PDF pp.9–16; SW01]

System sequence and working states

What the original reports describe about an encounter

Stage	Reported historical behavior	Operational purpose
Prepare	Identify the run and operator; make patient-side functions available	Establish the encounter context
Connect	Request remote participation over the available communications path	Bring clinical expertise into the encounter
Assess	Exchange physiological data, images, voice and relevant record information	Build a shared clinical view
Adapt	Use media-quality options or text where link conditions constrain interaction	Keep essential communication usable
Document	Maintain the run record and capture relevant inputs	Support continuity and later review
Conclude	End remote participation and manage patient-context display	Transition out of the active encounter
Archive	Transfer or synchronize run information for administrative retrieval	Complete the information handover

This sequence is a synthesis of the historical functional descriptions. It organizes the reported behavior for readers; it is not a recovered executable state machine. The source describes clearing displayed patient information on disconnect at the physician station and maintaining historical run access. Those are distinct functions with different purposes. [D07, PDF pp.10–13; SW01; SW03]

Human factors shaped the implementation

The report describes changes to video quality controls, system messages, local intercom and remote audio, and physician text messaging. Each change addressed a practical interaction problem: how to communicate clearly, preserve local care activity and help a remote clinician understand the patient with the available link. [D07, PDF pp.9–13]

Relevance to current architecture reviews

The historical sequence provides a useful set of questions for a new deployment: how encounter context is established, how participants join, what remains available during link loss and how documentation is reconciled. The exact current implementation of those behaviors belongs in the current technical baseline and executed verification records.

Verification before wider use

A staged program with distinct populations and objectives

Phase	Purpose	Reported activity
0 — engineering	Form, fit, function and integrated subsystem behavior	More than 200 tests/runs reported for August 2003–March 2004
1 — volunteers	Exercise the working system with healthy participants	102 runs, 29 March–16 July 2004
2 — stable patients	Operate with consenting patients in transport	32 transports, 10 December 2004–25 January 2005
3 — routine trauma runs	Use in the routine 9-1-1 workflow after approval	At least 131 runs listed; begun 22 December 2005 and ongoing in the report

Data: [D07](#), PDF pp.2–4, 27. These figures are activity counts. The categories are not a single clinical trial and must not be summed into a product success rate.

Subsystem coverage

The program lists 13 tested modules: remote connection, video, audio, camera control, navigation, vital signs, telestration, communications, barcode scanning, card reading, signature capture, run record/database and printing. This breadth shows that evaluation addressed the working system and its supporting functions. [\[D07, PDF p.4\]](#)

Independent usability input

The final report records an external functional assessment in July 2002 and heuristic assessments in April 2003, February 2004 and May 2006. It describes the resolution or implementation of recommendations from the first two heuristic rounds. It does not show that every finding from the final round was closed. [\[D07, PDF pp.8–9\]](#)

Measured experience and clinical inference

The program's conclusion explicitly separates positive operational experience from statistical demonstration of patient benefit. This is central to interpreting the foundation: the project established and exercised a complex field telemedicine system, while the available outcome data were insufficient for a statistical claim of improved patient outcomes. [\[D07, PDF p.73\]](#)

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From research to commercial development

Continuity in concept, with configuration changes over time

PUBLIC SOURCES [LifeBot guide, 2012](#) | [Frost & Sullivan, 2014](#)

The 2012 engineering record

A TCAT/TEES README dated 1 August 2012 and accompanying directory and manifest documents describe a DREAMS/Interact source distribution. The materials name Java and native components and provide a detailed inventory of development content. They are useful historical engineering references. A printed inventory alone does not establish that the complete source, build environment or production binaries have been independently reconstructed. [SW02 and companion manifest]

The product narrative

LifeBot's March 2012 design guide describes integrated telemedicine, patient information and community-care uses. The 2014 Frost & Sullivan report discusses LifeBot 5 and recognizes product innovation. It also reports an exclusive licensing arrangement dated August 2011. The award report is a secondary account of that arrangement; the underlying license and its current terms are not reproduced here. [REF01; REF02, PDF pp.3–7]

Distinct generations, one recurring problem

The original program, LifeBot 5 commercial material, the LifeBot 10 NASA evaluations and current DREAMS documentation describe different dates and configurations. The recurring problem is how to join examination tools, clinical information, remote expertise and documentation in a usable service. Historical experience is most useful when readers can see both that continuity and the configuration associated with each result.

Current product communication

Use the current technical sheets, selected equipment schedule and deployment record to describe a LifeBot installation. DREAMS 12.07.15, Build 3 is the owner-provided source designation; verify the installed build separately. This historical case adds research and deployment context, without establishing the current configuration.

Terminology: current Link is described as deployable. Historic publication titles retain their original wording where needed for accurate identification.

The foundation's lasting contribution

Design principles supported by the historical record

Connect the clinical decision

The original physician-presence concept focused on the decision that had to be made before hospital arrival. The later Alberta and Maryland cases show the same principle in different services: connect the information and expertise at the point where the care team must decide what happens next. [D01; AB01; MD02]

Integrate the working environment

Vehicle space, cameras, power, records, communications and training were all part of the program. The equipment had to fit the work of the medic and the remote clinician. That makes deployment engineering and workflow design essential parts of the system, rather than administrative work performed after equipment selection. [D07, PDF pp.8–16, 29–35]

Evaluate under representative conditions

The staged testing, mock ambulance, moving vehicles and field response exposed different forms of friction. NASA's later ground evaluations extend that theme to operator independence, constrained resources, clinical guidance and interoperability. A useful evaluation reproduces the environment and task that give the technology its purpose. [D07; NS01; NS04]

Make the result traceable

A strong case history identifies the device or service, the setting, the participants, the test question and the result. This collection follows that structure so readers can distinguish a demonstrated function, a service outcome, a design recommendation and a future plan. It turns a long program history into material that clinicians, engineers and acquisition teams can assess.

Foundation case statement

DREAMS grew from a university and Army-supported program that integrated remote clinical participation with ambulance systems, patient monitoring and electronic run information. Its reports document iterative engineering, staged field testing and emergency-response use. LifeBot's later clinical-service references and NASA ground evaluations provide additional, separately dated examples of the same connected-care challenge. [D01; D05; D07; AB01; MD02; NS01; NS03]

[LifeBot Public Release Set v1.3 — all documents and formats](#)

LIFEBOT / DREAMS | VOLUME 03 | PUBLIC EDITION 1.2

Maryland telehealth

Extending emergency medicine expertise into a continuing-care facility

PUBLIC SOURCES [Maryland project report](#) | [Maryland presentation](#)

University of Maryland Upper Chesapeake Health, Lorien Health Systems, Maryland Emergency Medicine Network and LifeBot developed a telehealth program around a specific operational problem: residents whose changing condition might be assessed and managed at their care facility with better information and access to an emergency physician. The resulting program combined LifeBot DREAMS with point-of-care testing, treatment resources, clinical workflows and physician coverage. [MD02, PDF pp.3–5]

Case identity	Reported setting
Location	Lorien Bel Air and Upper Chesapeake Medical Center, Maryland
Care environment	69 skilled nursing beds and 56 assisted-living apartments at the reported Lorien site
Baseline	1 October 2013 to 30 September 2014
Program observation	11-month pilot described in the project report
Technology role	LifeBot DREAMS monitoring, documentation and remote assessment connection
Evidence	Grantee report published through MHCC; provider presentation; earlier planning context

The value proposition in the case

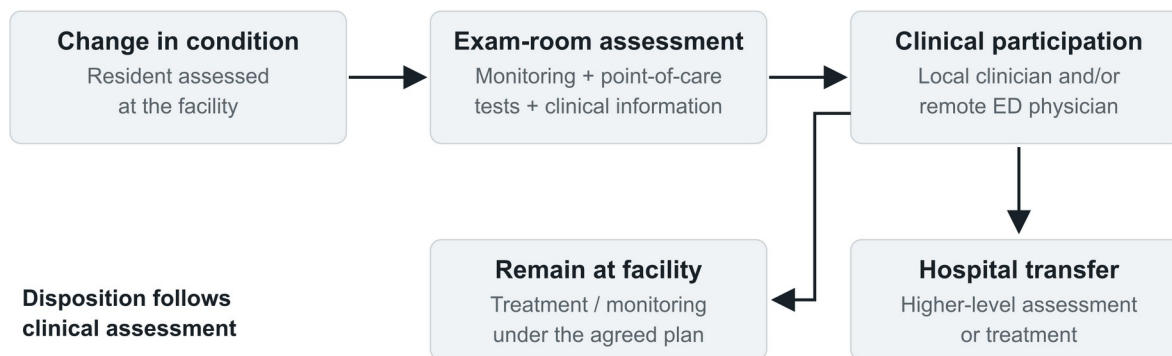
The program brought clinical information and emergency medical expertise into the facility before a transport decision was made. It also strengthened local assessment when the attending clinician was present. The result was a care model in which telemedicine, local diagnostic capability and access to treatment resources reinforced one another. [MD02, pp.3–4, 7–9]

The report recorded 87 uses of the examination room, high reported patient and physician satisfaction, and reductions in the program's utilization measures. Those are results of the combined service. They are not a device-only effect or a promise that another site will reproduce the same performance. [MD02, pp.6–10]

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How the service worked

A shared assessment environment linked to emergency physicians



Original description of the reported service sequence. Clinical escalation and transfer decisions remained with the care team. Based on [MD02](#), pp.3–5 and workflow appendix; [MD03](#), slides shown on PDF pp.6–11.

A detectable change in a resident's condition triggered the facility's assessment pathway. When the telehealth process was appropriate, staff gathered monitoring information and nursing documentation, obtained relevant point-of-care results and contacted the emergency physician. The remote physician could review the information, interview the resident and direct the available cameras. [[MD03](#), PDF pp.6–10]

Local and remote assessment both mattered

The examination room supported two related uses: assessment by the Lorient attending clinician and remote consultation with an emergency physician. Only about one in five room uses required the remote emergency consultation. The program therefore expanded useful local capability as well as specialist reach. [[MD02](#), p.7]

Disposition remained a clinical choice

The provider presentation describes three possible results: continue the existing treatment at Lorient, remain at Lorient with a revised plan, or transfer to hospital. The report states that clinicians at either location could request emergency transport if concerned about the resident. The objective was the appropriate location of care, with escalation available throughout. [[MD02](#), p.3; [MD03](#), p.11]

This workflow is a historical service description. It does not reproduce medication protocols, clinical eligibility rules or patient-specific treatment instructions.

Implementation beyond the equipment

Space, training, credentialing and clinician availability

Build the examination environment

The partners developed an examination room at Lorien and installed the receiving workstation at Upper Chesapeake Medical Center. Monitoring, camera views and documentation were combined with point-of-care testing. The room also included treatment resources agreed by the clinical partners. The project report presents this combined environment as necessary to give the clinician enough objective and subjective information to make a disposition decision. [MD02, pp.3–5]

Prepare both ends of the connection

The project plan included hardware installation, workflow design and training at both organizations. Nursing staff trained on the LifeBot system and the point-of-care laboratory process. Emergency physicians were trained and credentialed by Lorien for their role in the remote service. This matters because the ability to communicate with a clinician does not itself establish the clinician's authority or practical ability to act within another organization. [MD02, pp.4–5]

Make availability an operational commitment

During the first 90 days, the physician group funded call coverage so a named provider could respond. After that arrangement ended, coverage depended on the presence of trained physicians in the emergency department, and gaps occurred. The partners then described a payment approach intended to restore consistent coverage and support expansion. The report treats this as a service-design issue, not a failure of the communications device. [MD02, p.8]

Use feedback to improve the experience

Residents asked to see the emergency physician, and physicians wanted a stethoscope capability. The report describes resulting changes to the video experience and the development or implementation of the peripheral. These are useful examples of requirements emerging from actual use. They also explain why the capabilities mentioned in the early report and later provider presentation do not all appear at the same stage. [MD02, pp.4, 7–8; MD03, pp.9–10]

Prepare residents and families

The partners introduced information about telehealth into admission materials so families encountered the concept before an urgent change in condition. Their experience shows that acceptance is part of implementation: a functioning connection has limited value if participants do not understand the process or trust the proposed care pathway. [MD02, p.9]

Results and denominators

Reported utilization, experience and the distinction between targets and outcomes

Measure	Baseline / target	Reported result
30-day readmissions	13.6% baseline; 10.2% target	Annualized projection: 54 versus 83 baseline readmissions; report describes approximately 33% reduction.
Hospital admission rate	4.2 baseline; 3.2 target	3.6 overall; 2.4 in the final three months. Report describes 16% and 43% reductions respectively.
Emergency-department visit rate	6.8 baseline; 5.1 target	5.5 overall; reported annualized reduction of 42 visits, approximately 19%.
Exam-room utilization	Combined local and remote use	87 uses over 11 months; approximately one in five used remote ED consultation.
Reported satisfaction	Four-point scales	Residents: 3.5 / 4.0; physicians: 3.75 / 4.0.

Source: [MD02](#), PDF pp.6–9. Admission and ED rates are retained on the report's published scale. The text describes resident-day denominators but does not specify the rate multiplier in these passages; no multiplier is invented here.

Why some published percentages differ

The provider presentation reports 34% lower readmissions, 15% lower admissions and 19% lower ED transfers. The grantee report uses approximately 33%, 16% and 19%. These are parallel reported summaries, not identical numbers. Moreover, rounded counts of 83 and 54 imply about 34.9%, while 4.2 and 3.6 imply about 14.3%. This case preserves the source-reported values with their stated bases rather than silently substituting a new result. [[MD02](#), pp.6–7; [MD03](#), p.12]

A transfer can be the appropriate result

The report describes hospital transfer after 57% of emergency-physician televisits versus 15% of local-only room uses, and notes differences in the conditions assessed. Those groups are not risk-adjusted comparators. The difference cannot be used to claim that remote consultation caused more admissions or that local-only assessment was clinically superior. [[MD02](#), p.7]

The economic and operating case

Published estimates, payer effects and the work needed for sustainability

Historical estimates in the project report

The UMUH finance analysis estimated variable savings of about \$125 for an avoided emergency-department visit and up to \$450 for an avoided inpatient or observation day. The report projected hospital savings exceeding \$70,000 annually under the payment model then in use. It separately estimated approximately \$25,000 in payer savings from reduced ambulance transports. These are historical program estimates, not present LifeBot prices or measured savings attributable solely to its hardware. [MD02, p.10]

Keep costs, charges and savings distinct

The provider presentation explicitly labels its analysis as cost rather than charges and gives slightly different unit estimates: \$128 per ED visit and \$445 per patient day, with \$70,000 projected expense avoidance. The variations should remain attached to their respective sources. Payer transport savings and hospital operating savings also accrue to different organizations; adding them requires a defined perspective and protection against double counting. [MD03, p.13]

Investment and expansion

The report describes approximately \$80,000 to equip an additional examination room with telehealth, point-of-care testing and routine room equipment. It discusses joint funding by Lorian and UMUH, continuing physician compensation and expansion to two further Harford County sites. The near-first-year and within-18-month breakeven statements refer to projections and different implementation contexts in the report. They should not be converted into a universal payback period. [MD02, pp.9–10]

The strongest operational lesson

Technology supported the program, but sustainability depended on aligned incentives and a dependable clinical service. A new site needs to identify who provides coverage, who can order or deliver care, who finances the service and which costs or benefits accrue to each party. The historical case provides a well-developed example of these questions being addressed during implementation.

No present-day reimbursement policy, regulatory conclusion, product price or customer ROI is asserted in this historical case study.

What the Maryland case establishes

Clinical information, local capability and organizational alignment

The Maryland program is a detailed reference for implementing a connected care service. Its report identifies the institutions, equipment role, baseline, workflow, training, clinician-coverage challenge, utilization measures and economic assumptions. It also records how patient and provider feedback affected the system and process. [MD02, pp.3–11]

A disciplined reading of the results

The project was a before-and-after service evaluation rather than a randomized device trial. The authors explicitly identify uncertainty about whether every examination-room encounter would otherwise have led to a hospital visit. They caution that new availability could change demand and that comparable acuity information was difficult to establish. For this reason, the case uses reported rates and annualized projections with their labels, rather than treating every room use as an avoided transfer. [MD02, p.6]

Operational lessons that travel

- Combine communication with the monitoring, diagnostics and local treatment capability needed for the intended decision.
- Train the facility and remote clinicians together, including how the service is activated and when transport remains appropriate.
- Treat clinician coverage, credentialing and compensation as explicit parts of the operating model.
- Measure local-only use, remote consultation, subsequent transfer and follow-up separately.
- Explain the service before an urgent event and use patient and provider feedback to refine it.

Public case statement

A 2016 Maryland report describes LifeBot DREAMS as the telehealth component of a service linking Lorian Bel Air with Upper Chesapeake emergency physicians. Over the reported 11-month program, the service recorded 87 examination-room uses. Technology, point-of-care testing, local staffing and clinical workflows were evaluated together. The reported utilization and satisfaction findings describe that service; they do not isolate the effect of the LifeBot equipment. [MD02]

Reference route: [MD02](#) is the principal results source. [MD03](#) provides the provider's workflow and economic presentation. [MD01](#) is an earlier planning reference; its separate hospital-wide initiatives are not counted as LifeBot telehealth results.

[LifeBot Public Release Set v1.3 — all documents and formats](#)

Alberta mobile stroke

Moving specialist assessment into the rural transfer pathway

PUBLIC SOURCES [Alberta study, full text](#)

The University of Alberta's mobile stroke unit placed brain imaging, point-of-care testing and a secure specialist connection into the journey between a rural community and a tertiary hospital. A 2018 peer-reviewed report explicitly identifies LifeBot as the unit's telestroke equipment. The case demonstrates LifeBot's participation in a working multidisciplinary service with documented patient dispositions. [[AB01](#), pp.54–56 / PDF pp.1–3]

Case identity	Published description
Service	University of Alberta Hospital mobile stroke unit, Northern Alberta
Implementation	February 2017; early experience published in February 2018
Reach	Catchment within a 250 km radius of University of Alberta Hospital
Equipment combination	Custom ambulance, CereTom CT, LifeBot telestroke equipment and point-of-care laboratory
Cohort in the report	28 assessed patients / 28 dispatches
Evaluation type	Early observational report of the complete mobile stroke service

The access problem

The study describes the difficulty of bringing specialized stroke assessment to rural communities with long transfers to Edmonton. The mobile unit allowed imaging and neurological assessment to occur before arrival at the tertiary emergency department. This made destination selection part of the prehospital process. [[AB01](#), pp.54–55]

LifeBot's role

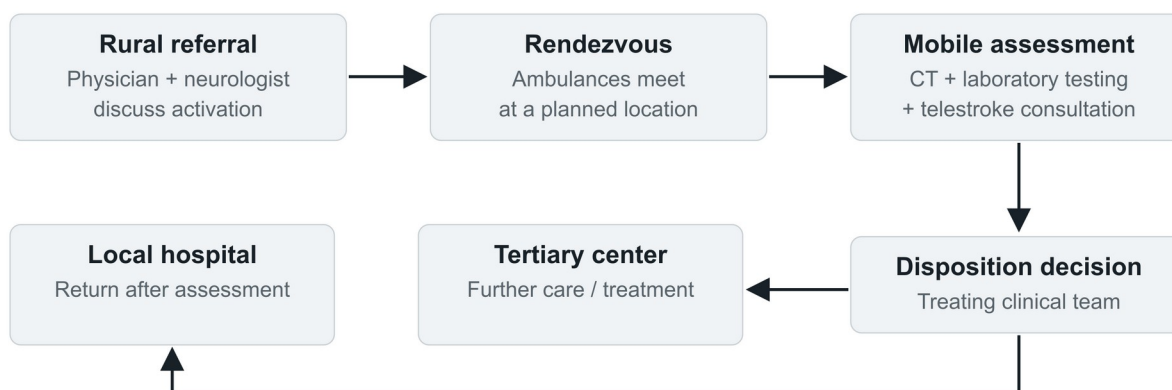
LifeBot supplied the named telestroke connection within the combined system. Imaging, laboratory information, clinical assessment, dispatch coordination and treatment capability came from the full service and its partners. The published results are therefore described as mobile stroke unit outcomes, with LifeBot's contribution identified precisely. [[AB01](#), p.55]

This case reports historical service operations. It is not a current clinical treatment protocol or a trial isolating the effect of LifeBot alone.

The operating model

Rendezvous, assessment and destination selection

The mobile stroke unit was integrated with Alberta's existing emergency medical services and telestroke network. A referring physician and the University of Alberta Hospital neurologist discussed the case. Where the mobile unit was appropriate, it travelled toward the referring location and met the incoming ambulance at a predetermined rendezvous point. Wireless connectivity was one consideration in selecting those locations. [AB01, p.55 and Figure 3]



Original service-flow illustration based on AB01, Methods and Figure 3. Clinical decisions remained with the treating team. The diagram describes the reported service pathway.

Information available before hospital arrival

The patient moved into the mobile unit for CT imaging and assessment. Images were transmitted to the telestroke neurologist, who also obtained history and neurological findings through the telemedicine link. The report describes a specialist team spanning stroke medicine, imaging, nursing and paramedicine. The image caption gives a shorter crew description than the Methods text; this case does not turn either list into a universal staffing requirement. [AB01, p.55]

Why the workflow matters

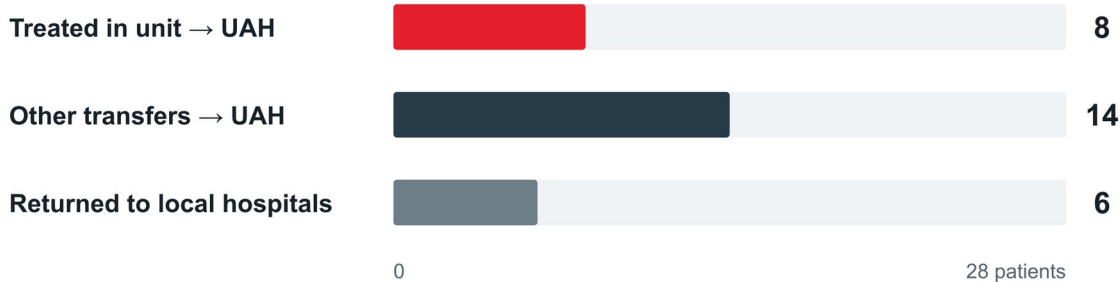
A network link has operational value when it reaches an available specialist at a meaningful decision point. In this service, the connection supported a decision about treatment and destination before the ambulance completed its journey. The rendezvous design also linked communications planning to transport planning: the best meeting point had to support both vehicle operations and specialist access.

For a new service, this suggests evaluating coverage at real transfer locations, assigning decision responsibility and measuring the complete interval from activation to disposition. These are implementation lessons drawn from the case, not new performance measurements.

The reported results

Twenty-eight assessments, three principal disposition groups

ALBERTA MOBILE STROKE UNIT: 28 ASSESSED PATIENTS



Original chart of the reported patient groups: 8 treated with intravenous thrombolysis and transported to UAH; 14 other transfers to UAH; 6 returned to local hospitals. Data: [AB01](#), pp.54, 56.

Reported group	Count	Share of 28
Treated in the unit and transported to UAH	8	28.6%
Other assessed patients transferred to UAH	14	50.0%
Returned to local hospitals	6	21.4%

Percentages are arithmetic calculations from the published counts, rounded to one decimal place. The groups sum to 28. They describe dispositions, not comparative effectiveness.

What happened within the groups

The eight treated patients received intravenous thrombolysis in the mobile unit and went to University of Alberta Hospital. The abstract reports no hemorrhage or other complications associated with those treatments. The paper also reports that one patient among the additional transfers received successful endovascular thrombectomy at the hospital. These observations belong to the reported cohort and clinical service. [\[AB01, pp.54, 56\]](#)

The six patients returned locally had been assessed and imaged before the disposition decision. Follow-up information described in the paper did not identify complications in that group. The authors nevertheless acknowledge that the small study could not establish with certainty equivalence to care at the tertiary facility. [\[AB01, pp.56–58\]](#)

The treated-patient table includes a transition to end-of-life comfort care in one case. A statement that every treated patient had a favorable long-term outcome would misrepresent the source. [\[AB01, Table 2\]](#)

What the study can support

Interpreting feasibility, triage and patient outcomes

A credible service-level finding

The study documents an operating rural mobile stroke model and shows that its team made different disposition decisions after field assessment. Some patients received treatment before hospital arrival, some continued to the tertiary center for further care, and others returned to their local hospitals. The contribution of telemedicine was to connect the assessment environment to specialist interpretation within that pathway. [AB01, pp.55–58]

What was not isolated

The study did not randomize patients to LifeBot versus another telemedicine platform or to telemedicine versus no telemedicine. CT, point-of-care testing, specialist staffing and the provincial transfer network all formed part of the intervention. Product-specific claims about reduced mortality, reduced treatment time or guaranteed avoidance of admission cannot be calculated from this report.

Counts and time periods

The abstract calls the cohort the initial four months of operation, while patient dates in Table 1 extend from February through July 2017. This volume identifies it as the early 28-patient cohort and preserves the February 2017 implementation date. It does not force the listed dates into an invented four-month window. [AB01, pp.54–55; Table 1]

The discussion uses approximate percentages when describing patients who did not require thrombolysis or further imaging. For the main disposition summary, this case uses the explicit counts of 8, 14 and 6. This avoids confusing a percentage of a subgroup with a percentage of all 28 patients.

Economic interpretation

The authors state that detailed economic evaluation was underway and describe possible offsets to the cost of the vehicle and crew. That is an economic hypothesis, not a completed return-on-investment result. The documented customer discussion is about service access, triage and resource allocation; a new buyer needs its own operating volumes, staffing costs and comparator pathway. [AB01, p.58]

Lessons for a connected service

Turning the Alberta experience into practical design questions

Design the clinical connection around a decision

The mobile stroke pathway gave the remote specialist imaging and clinical information before the final transport decision. A similar service should define which decision requires specialist participation and which information must be available at that point. Video quality, image access and the completeness of the clinical context should be evaluated together.

Treat communications as part of the route

Predetermined rendezvous locations were selected in part for wireless connectivity. That is a useful planning principle for rural, disaster and military medical transport: evaluate communications where transfers, examinations and handovers will occur, including the time and conditions under which teams will use those sites. [AB01, p.55]

Preserve the full outcome picture

A transfer to a tertiary center may be the correct outcome. A return to a local hospital may also be the correct outcome. The case's value lies in informed disposition, rather than maximizing the percentage of avoided transfers. Evaluation measures should therefore include clinical appropriateness, adverse events, specialist availability, data quality and subsequent escalation as well as transport counts.

Separate component performance from service performance

LifeBot's role can be assessed through connection availability, usability and the timely presentation of the required information. The service should additionally be evaluated through staffing, imaging, dispatch, treatment and follow-up measures. Keeping these levels separate makes it possible to identify whether a problem arises from equipment, connectivity, workflow or clinical service organization.

Public case statement

LifeBot was the named telestroke equipment in the University of Alberta's rural mobile stroke unit. The early 2017 cohort, reported in 2018, describes 28 assessments, including eight patients treated with intravenous thrombolysis in the unit and six patients returned to local hospitals after assessment. The service combined CT, laboratory testing, specialist expertise and telemedicine to support prehospital decisions. [AB01]

Primary reference: Shuaib et al., Mobile stroke unit triage of patients with a suspected stroke: a novel solution to reducing suspected stroke admissions in busy emergency departments. *BMJ Innovations* 2018;4:54–59. DOI 10.1136/bmjinnov-2017-000240.

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Field operations

DREAMS in ambulances, emergency departments and disaster response

PUBLIC SOURCES [DREAMS final report, 2006](#)

The original Digital EMS program took telemedicine beyond a laboratory workstation. Its 2006 report describes ambulance integration, remote physician stations, staged operational testing and deployment during the 2005 hurricane response. These cases show how the program addressed the practical relationship between patient care, communications, vehicle space, equipment protection and remote clinical support. [[D07](#), PDF pp.2–7, 29–47]



Historical source photograph: a Liberty County EMS DREAMS ambulance during the 2005 New Orleans response. Reproduced from the Digital EMS final report, [D07](#), PDF p.46.

Operating setting	Documented activity
Liberty County EMS, Texas	Engineering, volunteer and patient transport testing; ambulance and administrative station use
Memorial Hermann Hospital, Houston	Emergency-department physician station and remote support
2005 hurricane response	Ambulance and transportable station use in New Orleans and Texas
Military testbed	M997A2 ambulance integration and demonstrations
San Jacinto River EMS	Ambulance delivery and medic training described in May 2006

The dates and equipment in this volume belong to the original program. Counts, dimensions and communications arrangements are not specifications for a current LifeBot product.

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Liberty County EMS

Building an operational path from the vehicle to the physician

PUBLIC SOURCES [DREAMS final report, 2006](#)

The connected working environment

The program installed a patient-side system in an ambulance, a physician station in the Memorial Hermann emergency department and an administrative station at Liberty County EMS. The administrative station supported searching, printing and training with archived run records. Wireless upload when an ambulance returned to its parking location connected the transport workflow to the agency's record workflow. [[D07](#), PDF pp.4–5]

Progression into patient operations

The report records 102 volunteer runs between 29 March and 16 July 2004, followed by 32 patient transports between 10 December 2004 and 25 January 2005. Routine 9-1-1 trauma operations entered Phase 3 after approval on 22 December 2005. The report's Phase 3 table lists at least 131 runs and describes the activity as ongoing. These are reported run counts, with different objectives and populations in each phase. [[D07](#), PDF pp.4, 27]

The information exchange

The physician interface combined video, physiological information, navigation and communication with the field team. The report describes text messaging as useful when bandwidth was constrained, ECG rhythm and 12-lead viewing, and access to historical run information. At the patient station, cameras, monitor integration, barcode and card inputs, signature capture and printing were part of the wider system under test. [[D07](#), PDF pp.10–13]

The operational lesson

The project connected an acute encounter to both a specialist and an agency record. This is a useful design principle for deployed medical services: define the immediate clinical exchange and the later information handover together. A connection that ends when the video call ends may leave documentation, review and follow-up work unresolved.

The program's conclusion describes administrative efficiency and positive operational experience, while explicitly stating that the available data did not support statistical proof of improved patient outcomes. The strongest claim is therefore documented operational integration and progressive field use. [[D07](#), PDF p.73]

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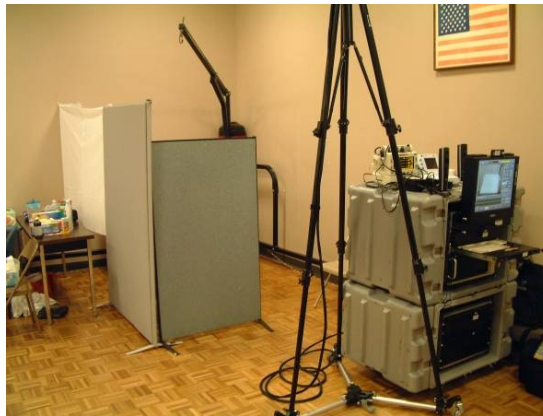
Hurricane response, 2005

Deploying clinical connections into disrupted care environments

PUBLIC SOURCES [DREAMS final report, 2006](#)

New Orleans and displaced communities

The Digital EMS report describes a Liberty County EMS ambulance deployed to New Orleans after Hurricane Katrina. It also describes a first-generation transportable station at the Nacogdoches public library, supporting an Alabama Disaster Medical Assistance Team caring for evacuees, with remote clinical support from Memorial Hermann in Houston. The account demonstrates deployment of the program's equipment into an emergency response setting. [[D07](#), PDF pp.46–47]



Historical transportable station installation pictured in [D07](#), PDF p.47. The program narrative identifies the Nacogdoches public-library response location.

Rye, Texas

After Hurricane Rita, a second-generation station supported a temporary clinic in Rye, Texas. Liberty County EMS medics and volunteer physicians worked at the location. The report describes operation for approximately a week and reliance on cellular communications where the public communications network was unavailable. [[D07](#), PDF p.47]

What the deployments establish

These accounts document equipment placement, participating teams and a remote support arrangement. They make the disaster-response use case concrete: bring the examination tools and communications to the place where patients and responders are located. The report does not supply a storm-specific patient denominator, controlled comparison or measured mortality effect. Its event list and narrative also use different storm labels for part of the Texas response; this case retains the clearly documented 2005 response context. [[D07](#), PDF pp.46–47, 65]

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Military ambulance integration

Preserving the vehicle's medical mission while adding remote capability

PUBLIC SOURCES [DREAMS final report, 2006](#) | [Texas A&M program](#)

The M997A2 ambulance testbed addressed a fundamental integration problem: medical communications equipment had to fit into an existing vehicle without compromising its primary care and transport functions. The program described stowage, mounting, wiring, power and thermal arrangements, as well as camera placement and the interaction between installed equipment and the patient workspace. [D07, PDF pp.29–35]

Integration question	Program experience
Space and access	Fit equipment around the ambulance's care and transport functions; stow components when not in use
Mechanical environment	Evaluate shock mounts and the effects of rough-road operation on installed equipment
Power and heat	Integrate supply, cabling and thermal management into the vehicle configuration
Clinical view	Position cameras and controls to support the field team and remote physician
External equipment	Evaluate integration of separately developed peripherals, including the TATRC MediCam

Engineering characterization

The report discusses measured rough-road acceleration and references a military vibration method in characterizing the vehicle environment. Such engineering work is meaningful evidence of attention to field conditions. It does not establish a blanket environmental certification for every DREAMS configuration or for a current LifeBot product. [D07, PDF pp.30–35]

Demonstrations and participating organizations

The report records demonstrations involving the Chemical Biological Incident Response Force and evaluation activity involving the Air Force Medical Evaluation Support Activity. It also states that the Army had not requested a demonstration during the described program period. Named participation is described at that level; no service-wide procurement or operational adoption is inferred. [D07, PDF p.7]

A durable planning lesson

For defense and emergency response customers, integration should be treated as a vehicle and service project. Installation drawings, crew access, equipment restraint, maintainability, power behavior and communications coverage are part of the delivered capability, alongside the telemedicine software.

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Transportable stations and expansion

Practical deployment lessons from the program's later work

PUBLIC SOURCES [DREAMS final report, 2006](#)



Historical first-generation transportable station, [D07](#), PDF p.46. This is original program equipment, not a current Link specification.

Reducing deployment burden

The report describes successive transportable station designs and reductions in their size and mass. The first approach used a large transport enclosure; later work produced a more compact station for field care locations. The engineering narrative connects those changes to setup, power flexibility and the ability to move the capability to the response site. [\[D07, PDF pp.46–47\]](#)

Training before expansion

A DREAMS ambulance was delivered to San Jacinto River EMS in May 2006. The report describes four-hour train-the-trainer instruction for 12 medics. Its detailed narrative says that Phase 3 testing at that site had not yet begun and was expected under a follow-on effort. The proposed rural-hospital connection at Liberty-Dayton was not completed before the original project ended. [\[D07, PDF pp.5–7\]](#)

Communications were an engineering variable

The program evaluated cellular, radio and satellite approaches. Some options were constrained by coverage, upstream throughput, reliability, latency, terminal practicality or cost. One radio prototype encountered throughput and link-control problems, and demonstrations reverted to cellular communications. The record is useful because it shows that selecting a bearer was an empirical engineering decision. [\[D07, PDF pp.14–16\]](#)

A modern deployment plan should similarly name the operating locations, available bearers, fallback workflow and responsible support team. Historical use of multiple communications approaches establishes program experience; it does not guarantee performance over every network.

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Later institutional references

Documented equipment support, demonstrations and partnerships

PUBLIC SOURCES [Trinity Health history](#) | [Dayton report, 2015](#) | [e& partnership](#) | [Frost & Sullivan, 2014](#)

Trinity Health

Trinity Health's own auxiliary history lists a "Life Bot" among equipment supported by the auxiliary. This confirms an institutional equipment reference. The page does not provide a deployment date, configuration or patient outcomes. [\[WEB-TRINITY\]](#)

Dayton demonstration, 2015

A local report describes a Dayton ambulance demonstration connected to Methodist San Jacinto Hospital in 2015. [\[WEB-CHRON\]](#)

e& enterprise

An e& enterprise announcement describes a LifeBot partnership for virtual care in UAE critical sectors. The accessed announcement does not show a publication date. It supports the partnership narrative and intended service direction. It does not enumerate completed deployments or measured patient outcomes. [\[WEB-EAND\]](#)

Commercial recognition

Frost & Sullivan's 2014 report names LifeBot for North American New Product Innovation Leadership in portable telemedicine solutions. The report discusses the LifeBot 5 offering and the commercial development of the DREAMS concept. It is an industry assessment and award document, with the product and market context of its publication year. [\[REF02\]](#), PDF pp.3–7, 10]

How to use these references

Institutional references answer different questions. An equipment history establishes that an organization named the equipment. A demonstration report establishes an event and a connection. A partnership announcement establishes a stated relationship. An award report establishes the recognition and the published assessment. These can support a detailed commercial history when each is presented for the fact it actually records.

For a customer evaluating a new service, the next useful conversation concerns the proposed clinical pathway, installation setting, support model and measurable acceptance criteria. The detailed NASA, Alberta, Maryland and original DREAMS cases in this collection supply the stronger operational and evaluation context.

Web reference titles and links appear in Volume 07. The publication set does not imply endorsement by the institutions it discusses.

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Evaluation findings

What the research and service record demonstrates

PUBLIC SOURCES [DREAMS final report, 2006](#) | [NASA evaluation, 2024](#) | [Alberta study, full text](#) | [Maryland project report](#)

The LifeBot and DREAMS record contains several kinds of evaluation: integrated engineering tests, human factors reviews, clinical-service observations and NASA ground-device studies. Each answers a different question. Taken together, they support a detailed discussion of connected medical operations, while retaining the configuration and setting associated with each result.

Evaluation	Unit being evaluated	Principal contribution
Original DREAMS	Integrated ambulance and remote-station system	Field integration, staged testing, usability and communications experience
NASA, 2024–2025	Named medical devices in ground studies	Capability mapping, operator use, clinical data quality, environment and integration
Alberta, 2017 cohort	Complete mobile stroke service	Patient dispositions after imaging, assessment and specialist connection
Maryland pilot	Facility-based telehealth service	Utilization, adoption, workflow and historical economic estimates

A useful evaluation hierarchy

A device function may work in a test without proving that a complete service is effective. A service may improve a reported utilization measure without isolating the effect of one device. A mechanical exposure may be completed without establishing software safety. The appropriate conclusion follows the actual unit of evaluation and the recorded result.

How to read this volume

The following pages compare the findings, explain environmental and installation assessment and provide a practical evaluation framework for a proposed service. The framework is advisory: its criteria are recommended planning inputs, not tests represented as already executed.

Source routes: [D07](#); [NS01](#), [NS03–05](#); [AB01](#); [MD02–03](#). Volume 07 supplies annotated references and document locations.

NASA evaluation synthesis

Five dimensions of a usable medical system

PUBLIC SOURCES [NASA evaluation, 2024](#) | [NASA journal review](#) | [NASA findings, 2025](#)

Dimension	Published observation	Design implication
Capability coverage	LifeBot 10 plus a defibrillator module mapped to 17 of 39 lunar and 16 of 36 Mars capabilities	Match equipment and accessories to a defined mission capability list
Operator usability	Participants completed tasks; additional familiarization and guidance were useful	Design for the intended operator, including work without continuous expert coaching
Clinical usability	Ultrasound quality and guidance remained development priorities	Evaluate diagnostic usefulness separately from successful image acquisition
Environment	Ground studies examined alternate atmosphere operation and simulator accuracy	Define environmental conditions, configuration and pass criteria explicitly
Integration	Later findings identified an outdated LifeBot application programming interface (API) and data-transfer friction	Verify complete data movement and application compatibility in the target architecture

The 2024 materials describe exploratory demonstrations and ongoing comparison work. The 2025 poster consolidates lessons and motivates a custom integration approach. They should be read as a sequence: functions and operator experience were demonstrated; later findings identified architecture, data, guidance and resource priorities. [\[NS01, pp.3–15; NS03, section 3.1.2; NS04\]](#)

What carries into an Earth-based deployment

A constrained ground service may face analogous problems: limited space, intermittent access to specialists, mixed operator experience and multiple applications that need the same clinical information. The relevance is the evaluation method—test the whole task and information path under representative conditions. Space-mission requirements are not automatically requirements for a rural clinic or ambulance.

The NASA sources discussed here are ground evaluations. They do not establish LifeBot flight certification, flight operation or endorsement. The 2025 poster’s flight-certification finding concerns Tempus; it must not be reassigned to LifeBot.

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Clinical-service evaluation synthesis

Read the patient pathway and the operating model together

PUBLIC SOURCES [Alberta study, full text](#) | [Maryland project report](#)

Question	Alberta mobile stroke	Maryland telehealth
What changed?	Imaging and specialist assessment moved into a rural transport pathway	A facility assessment room and remote ED connection supported decisions before transfer
What was counted?	28 assessments with treatment and disposition groups	87 room uses; annualized utilization measures over an 11-month pilot
What was the comparison?	Early descriptive cohort	Historical baseline and program targets
What does the result support?	Feasibility and documented triage within the combined service	Service adoption and reported changes in utilization
What requires care?	Small cohort; no platform-isolating comparator	Changing coverage, mixed local/remote use, rounded measures and counterfactual uncertainty

A transfer can represent success

Both cases center on making a better-informed disposition decision. Sending a patient to a higher level of care may be the correct result of improved assessment. Avoided transfers are useful to count when they are clinically appropriate, but a target that rewards avoidance alone can misrepresent the service's purpose. Evaluation should include subsequent escalation and adverse events alongside utilization.

Measure the service that was actually delivered

Maryland's report distinguishes local room assessments from encounters involving a remote emergency physician. Alberta's service combines the telemedicine link with CT, laboratory testing, transport coordination and specialist expertise. A new study should preserve those distinctions in its data so results can be interpreted at the correct level. [AB01; MD02, PDF pp.7–9]

Economics should follow the observed pathway

Alberta's paper describes further economic work as ongoing. Maryland's reports provide historical cost assumptions and annualized projections. A current business case needs local activity, staffing, support, connectivity, equipment and reimbursement inputs. The historical figures can explain the structure of an economic model; they should not be used as a current quotation or guaranteed saving.

Environment and installation

Evaluate the complete assembly in its intended operating setting

PUBLIC SOURCES [NASA evaluation, 2024](#) | [DREAMS final report, 2006](#)

NASA examined medical-device use in a ground chamber under alternate atmosphere conditions. The original DREAMS program examined vehicle integration, communications coverage, equipment operation and field workflows. These studies show why the installed assembly and operating context matter alongside individual device capabilities. The following questions guide future assessment. [[NS01](#), pp.3, 12–15; [D07](#)]

Assessment area	Published basis	Question for a proposed installation
Device operation	NASA reports nominal chamber operation and simulator comparisons before and after exposure	Does the identified equipment perform its intended tasks under the specified conditions?
Operator and peripherals	NASA describes procedure completion, familiarization needs and ultrasound guidance concerns	Can the intended user obtain usable information with the selected accessories and training?
Vehicle integration	DREAMS describes ambulance installations, military testbed integration and engineering tests	Do the mounting, access, power and clinical workflow fit the selected vehicle and crew?
Communications environment	DREAMS describes coverage testing, bearer selection and service constraints	What information can be exchanged at the intended locations, and what happens when a connection is interrupted?
Information integration	NASA identifies data-transfer and application-interface issues	Can information reach the required applications while retaining its identity and clinical context?

Define the assembly and the conditions

An evaluation should identify the device, installed mount, peripherals, software, power arrangement and communications equipment. State whether the system is stationary, moving, in a chamber or deployed in the field. Record the initial condition, task, observation and post-test condition so the result remains attached to the tested arrangement.

Keep the conclusion aligned with the test

Successful operation in a ground demonstration supports the tasks and conditions observed. A vehicle study supports its recorded integration findings. A proposed service should define its applicable conditions and acceptance criteria; neither study supplies a universal environmental rating.

A practical assessment framework

Seven priorities for a proposed connected-care service

PUBLIC SOURCES [DREAMS final report, 2006](#) | [NASA findings, 2025](#)

Priority	Detail to establish before evaluation	Useful measure or record
1. Mission and users	Clinical decision, care setting, operator roles and escalation authority	Approved service description and representative task set
2. Configuration	Product, build, accessories, application versions and installation design	Configuration list with identifiers and change history
3. Information path	Patient/session context, streams, records, destinations and handovers	Interface map and observed end-to-end record trace
4. Communications	Locations, coverage, bearers, contention and fallback workflow	Representative connection and recovery observations
5. Clinical usability	Operator training, guidance, signal/image usefulness and remote participation	Task completion, data-quality review and user feedback
6. Operations and resilience	Coverage, support, power, maintenance, interruptions and restoration	Operating procedures and witnessed recovery records
7. Outcomes and economics	Comparator, denominator, follow-up, costs and attribution	Prespecified measures, complete cohort and local cost model

Specify success before collecting results

An evaluation plan should name the question, the environment, the participants, the data to capture and the acceptance criteria. Record whether the result concerns a component, a complete system or a clinical service. This structure makes it possible to interpret both successes and problems without changing the question after the data are available.

Choose measures that support the decision

A procurement demonstration may establish usability and connectivity in a proposed setting. A technical acceptance exercise may verify defined information and recovery behavior. A clinical evaluation may assess patient pathways or utilization with appropriate oversight. These activities can inform one another, but their approvals, methods and conclusions remain identifiable.

This framework is a recommendation for planning. It adds no invented test results to the historical evidence record.

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Information, interruptions and recovery

Recommended questions for end-to-end verification

PUBLIC SOURCES [DREAMS final report, 2006](#) | [NASA findings, 2025](#)

Scenario family	Question to answer	Evidence to retain
Normal encounter	Does the correct patient/session context accompany the required information to the intended destination?	Configuration, steps, destination record and timestamps
Timeout or disconnect	What does each user see, what persists locally and how is incomplete work identified?	Observed states, logs and retained record
Duplicate or replay	Can repeated requests or messages create unintended effects or ambiguous records?	Request correlation and resulting state
Unauthorized or wrong context	Are access and patient/session controls applied at the relevant boundary?	Permitted/blocked behavior and audit entry
Recovery and reconciliation	Does restoration preserve record identity and clearly distinguish pending, failed and completed work?	Before/after state and reconciliation record
Clinical data quality	Is the information usable for the intended clinical task under representative conditions?	Qualified review using agreed criteria

These questions reflect the system problem exposed across the original DREAMS work, NASA integration findings and the two clinical services. They are proposed verification topics, not a statement that the historical studies executed every scenario. Production or clinical testing requires the system owner's approved setting, procedures and clinical governance.

Record what makes the result reproducible

For each executed case, retain the exact configuration, operator role, initial state, steps, expected result, observed result and associated logs or records. Capture the time and the responsible witness. If a result depends on a network, device or third-party application, identify that dependency. This creates a technical record that can be reviewed after the demonstration has ended.

Preserve both sides of a transfer

Successful presentation at one screen is only one observation. For a data transfer, review the originating record, the destination record and the status shown to the operator. Recovery should be assessed against the intended information and state behavior, including how incomplete work is recognized and resolved.

Evaluation conclusions

A coherent record of integration, field use and service experience

The engineering contribution

The original DREAMS program demonstrates sustained integration work across the patient station, remote physician environment, communications and records. Its staged tests and field accounts make the development history concrete. Its explicit acknowledgement about patient-outcome statistics also helps readers interpret the level of the result. [D07]

The device-evaluation contribution

NASA's ground studies place LifeBot 10 in a demanding evaluation context. Capability mapping, operator experience and integration findings give technical readers substantive material to assess. The later development priorities—guidance, clinical data quality, interoperability and resource use—are part of that contribution. [NS01; NS03–05]

The clinical-service contribution

Alberta documents a rural mobile stroke service in which LifeBot was the named telestroke equipment. Maryland documents a facility telehealth program in which LifeBot DREAMS was part of a broader assessment and treatment model. Together, the cases demonstrate participation in distinct care pathways and show why service design matters alongside the equipment. [AB01; MD02–03]

The acquisition discussion

For a new customer, the most useful next step is to map the proposed mission onto a named configuration, service model and evaluation plan. The record supports asking detailed questions about who uses the system, what information reaches the remote clinician, how the workflow handles interruptions and how success will be measured. The historical cases give those questions operational substance.

Case evidence in brief

LifeBot and DREAMS have a documented history spanning university and Army-supported field telemedicine development, disaster-response use, clinical-service implementations and NASA ground-device evaluations. The published record describes integrated medical information, remote participation, operator experience and service results in identified settings. This collection presents those cases with their original dates, methods and reported findings.

Use Volume 07 to locate the primary documents supporting each case. Current product selection and deployment commitments should be based on the current datasheets and the agreed installation and service specification.

[LifeBot Public Release Set v1.3 — all documents and formats](#)

Public source and reference guide

Find the evidence, its date, scope and access route

Use this guide to trace the NASA, Alberta, Maryland and DREAMS heritage cases to their primary records. Start with the relevant case, check the study date and configuration, then read the source's findings and limitations. The linked collection Source Guide distinguishes a reachable page, an access-limited record and a locally included public reading copy.

NS01 | Multifunction integrated medical-device evaluation, 2024

Lewandowski, Schkurko, Calaway, Miller, Easter, Suresh, Lehnhardt and Thompson. A Multi-faceted Approach to Demonstrating Multi-functional Integrated Medical Devices to Advance Earth-Independent Medical Operations. NASA Human Research Program Investigators' Workshop, 2024. Supplied presentation: 16 pages. Use slides 3 and 8–15 for study assignments, capability counts, usability, atmosphere and integration. NASA record 20240001624.

[Read the NASA presentation — ntrs.nasa.gov](https://ntrs.nasa.gov)

NS02 | AIREX bibliographic record, 2024

One-page record for the NS01 presentation, dated 26 February 2024. Useful for the abstract and bibliographic identity. It describes the same evaluation publication and is not an additional independent trial.

NS03 | Peer-reviewed NASA technology review, 2024

Lewandowski et al. Technology modification, development, and demonstrations for future spaceflight medical systems at NASA. Frontiers in Space Technologies, 15 July 2024. DOI 10.3389/frspt.2024.1384457. Supplied article: 17 pages. Section 3.1.2, PDF pp.7–8, describes LifeBot 10 in HESTIA; Figure 6 depicts the equipment. Other technologies in this broad review are not automatically LifeBot technologies.

[Read the journal article — www.frontiersin.org](https://www.frontiersin.org)

NS04 | Custom integration findings, 2025

Lewandowski, Haddix, Nelson and Schkurko. Custom Integration of Multiple Medical Functionalities. NASA HRP Investigators' Workshop poster, 2025. One page. Table 1 and the concept sections are the main sources for the later device findings and CHP-ICT direction. Read the device columns carefully, particularly for flight-certification attribution.

NS05 | NASA poster catalog record, 2025

NASA Technical Reports Server record 20250000099. Supplied two-page capture identifies the poster and the January 2025 workshop. It provides catalog context for NS04, not a separate executed dataset.

Clinical-service references

Alberta mobile stroke and Maryland facility telehealth

AB01 | University of Alberta mobile stroke cohort

Shuaib A, Amlani S, Kalashyan H, Morrison L, Khan K, Jickling G, Buck B, Butcher K, Saqqur M and Jeerakathil T. Mobile stroke unit triage of patients with a suspected stroke: a novel solution to reducing suspected stroke admissions in busy emergency departments. *BMJ Innovations* 2018;4:54–59. DOI 10.1136/bmjinnov-2017-000240; first published online 6 February 2018. Methods on p.55 identify LifeBot; results and Tables 1–2 provide the early cohort. The assessment concerns the complete service.

[Read the full article — lifebothealth.com](http://lifebothealth.com)

MD02 | MHCC telehealth grantee reporting, 2016

Maryland Health Care Commission telehealth project report compilation. Supplied file: 42 pages. The Upper Chesapeake / Lorien section is PDF pp.3–20. Use PDF pp.3–5 for the service and equipment, pp.6–9 for utilization, adoption and interpretation, and pp.10–11 for historical costs and operations. Other grantees in the compilation are not the LifeBot pilot. This is program reporting with a historical baseline, not a randomized platform comparison.

MD03 | Upper Chesapeake telehealth presentation, 2016

Colin Ward, University of Maryland Upper Chesapeake Health. Telehealth program presentation, supplied as 14 pages. Pages 6–11 illustrate the assessment pathway; p.12 summarizes utilization; p.13 presents historical cost estimates; p.14 describes proposed expansion. The reported percentages are rounded differently from the grantee report. This is a second account of the same program, not an independent replication.

MD01 | Emergency medicine case study, 2015

Brookings / Merkin Initiative emergency medicine case study concerning Upper Chesapeake. Supplied file: six pages. Page 6 discusses the proposed telehealth pilot and grant. Earlier pages describe broader emergency medicine and hospital initiatives. Their results must not be relabelled as LifeBot pilot outcomes.

How to cite the Maryland results

Identify the source and whether a number is a baseline rate, target, observed rate, annualized estimate or projection. The case-study volume retains reported values and explains the rounding differences. It does not invent an unspecified rate multiplier or convert every room use into an avoided hospital transfer.

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Original Digital EMS reports

The principal records for the DREAMS foundation

PUBLIC SOURCES [1999 report](#) | [2000 report](#) | [2001 report](#) | [2002 report](#) | [DREAMS final report, 2006](#)

D01 | Digital EMS early report

James H. Duke Jr. / University of Texas Health Science Center at Houston. Report dated February 1999, covering 23 January 1998–22 January 1999, award DAMD17-98-2-8002. Supplied as D01_1998_DigitalEMS.pdf, 31 pages. PDF pp.5–7 support the early clinical concept and engineering objectives.

D03 / D04 | Subsequent early program reports

D03: October 2000 report, period 23 January 1999–22 September 2000, 105 pages; filename carries 1999. D04: October 2001 final report, period 23 January 1998–22 September 2001, 110 pages; filename carries 2000. These extend the early development context. Cover and reporting-form labels in D03 are not fully consistent.

D05 / D06 | October 2002 annual report

Digital EMS annual report, award DAMD17-01-2-0054, period 26 September 2001–25 September 2002. Each supplied file has 234 pages. D05 and D06 are byte-identical despite D06's “Final” filename. Count them once. PDF p.5 provides the earlier ARPA project lineage; the report's contents identify the expanding engineering and human factors work.

D07 | Digital EMS final technical report, 2006

Texas A&M program report, 76 supplied pages, describing Digital EMS through termination of the original project in May 2006. Principal case source: PDF pp.2–13 for phases, stations, assessment and software; pp.14–16 for communications; p.27 for phase counts; pp.29–35 for vehicle integration; pp.46–47 for response deployments; p.73 for the conclusion. Use PDF page numbers because running headers and section labels are imperfect.

D08 | Broader DREAMS final-report front matter

Supplied four-page front matter: cover dated 10 November 2006; reporting form dated 30 June 2006; award DAMD17-00-2-0010. The form declares 1,264 pages, which are not contained in this four-page file. Use only for the program identity and distinction between Digital EMS and Detection and Remediation.

P01 | Texas A&M DREAMS brochure

Seven-page supplied brochure. The filename carries 2002, while the printed production notation is 5/00. Useful for the formative vision and program branches. Its opening rescue story is an illustrative scenario, not a documented patient outcome.

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Engineering and commercial references

Design documentation, historical product context and test records

PUBLIC SOURCES [LifeBot guide, 2012](#) | [Frost & Sullivan, 2014](#)

SW01 | DREAMS Software Design Document

Supplied historical design document, 198 pages. Opening architecture sections describe client/server components, data handling, Java/native integration and communications. Used here at functional level. It does not authenticate current production ports, configuration, database schema or build 3.

SW02 | TCAT/TEES source-distribution documentation, 2012

DREAMS/Interact Source Distribution README, 1 August 2012, three pages, with a 21-page directory tree, 391-page manifest and seven-page installation guide. These are documentary inventories of development materials. They are not equivalent to source-code files or a reproduced build.

SW03 | LCEMS software functional description, 2004

R. Douglas Tindall, Project Director, DREAMS Digital EMS Project, UT-Houston. Liberty County Emergency Medical Services Digital EMS Software Functional Description and Screen Captures, LCEMS-ATA2004R2; 59 pages. Used with SW01 and [D07](#) to explain the historical encounter workflow. Period medic/physician manuals and training handouts provide supporting operational context.

REF01 / REF02 | LifeBot commercial development references

[REF01](#): LifeBot telemedicine technology design guide, March 2012, 12 pages. [REF02](#): Frost & Sullivan 2014 North American New Product Innovation Leadership report, 15 pages, recognizing LifeBot in portable telemedicine solutions. Use for dated product positioning and industry recognition. Historical pricing, broad promotional comparisons and reported licensing terms are not current specifications or an underlying license instrument.

LB01 | Illustrative LifeBot use cases

Three-page supplied use-case summary. Its filename carries 2018, while the content includes 2014 copyright material. Rescue and resuscitation stories are presented as scenarios; this collection does not transform them into observed clinical cases.

Research record and source use

A guide to the studies behind the cases

PUBLIC SOURCES [DREAMS final report, 2006](#) | [Texas A&M program](#)

Begin with the case and its primary record

NASA: use the 2024 presentation, 2024 journal review and 2025 poster together. Alberta: use the full BMJ Innovations article. Maryland: read the Upper Chesapeake / Lorien section of the project report and compare the provider presentation. Field operations and the DREAMS foundation: use the original 2006 Digital EMS final report with the earlier program reports.

Reading objective	Source route	What to examine
Understand a tested device	NS01 , NS03 , NS04	Configuration, setting, tasks, capability lists and findings
Understand a clinical pathway	AB01 , MD02 , MD03	Service design, cohort, workflow, staffing and reported results
Understand deployment history	D07	Named locations, equipment roles, test phases and operational accounts
Trace the program foundation	D01 , D03 , D04 , D05 , WEB-TAMU	Document dates, program identities and university context
Understand commercial context	REF01 , REF02	Historical product positioning and dated industry recognition

Keep companion research in its program context

The wider DREAMS archive also contains clinical and STAT reports and work on detecting or remediating chemical and biological threats. These help explain the breadth of the research program. They are distinct from the Digital EMS software, ambulance integration and telemedicine cases presented here.

Read results at the level that was evaluated

A device study reports device findings. A clinical-service evaluation reports the combined service, including its staffing, procedures and other equipment. A deployment account identifies the event and system role. These distinctions make the cases more useful for technical comparison and future evaluation planning.

Use dates and source-page locators

A source's publication date can differ from the dates of the work it describes. This collection retains those distinctions and gives page or section locators beside detailed claims. Source titles in the reference guide and the public-source links in each case identify the documents used.

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Online references and figure credits

Institutional context, access notes and navigation

WEB-TAMU | Texas A&M TCAT: DREAMS

Institutional program description. Accessed 9 September 2026.

[Source record / publication — tcat.tamu.edu](#)

WEB-TRINITY | Trinity Health Auxiliary history

Institutional equipment-history reference. Accessed 9 September 2026.

[Source record / publication — www.trinityhealth.org](#)

WEB-EAND | e& enterprise / LifeBot partnership

Partner announcement. Accessed 9 September 2026; no publication date inferred.

[Source record / publication — www.eandenterprise.com](#)

WEB-CHRON | Dayton LifeBot demonstration report

Casey Stinnett, 1 October 2015. Accessed 9 September 2026.

[Source record / publication — www.chron.com](#)

Figures and original illustrations

NASA equipment photograph: [NS03](#), Figure 6, by the article's authors, reproduced under the article's CC BY license with attribution. Historical ambulance and transportable-station photographs: [D07](#), PDF pp.46–47, reproduced as source illustrations within the associated case analysis. No NASA or military seal is used as an endorsement mark. Charts and workflow diagrams were newly drawn from the cited counts and descriptions; they are not screenshots of an executed current system.

Access and citation convention

Underlined source identifiers open an online record or full text. Page locators refer to PDF pages unless journal pages or slides are specified. The collection Source Guide records access checks dated 9 September 2026, including unavailable or access-limited routes. NASA presentation and poster claims were checked against the supplied primary files; catalog records identify those same works and do not represent additional studies. Historical engineering references without a public route remain bibliographic context.

Public edition 1.2 | 9 September 2026. Seven volumes: NASA; Alberta; Maryland; field operations; DREAMS foundation; evaluations; references. The combined casebook preserves the same case content.

[Current source access and applicability guide](#)

[LifeBot Public Release Set v1.3 — all documents and formats](#)