



# AFRL

## TROOPER TO TRU - THE FIRST CIVILIAN PREHOSPITAL APPLICATION OF THE BATTLEFIELD ASSISTED TRAUMA DISTRIBUTED OBSERVATION KIT (BATDOK)

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# DISCLOSURE

- No COI
- THE VIEWS EXPRESSED ARE THOSE OF THE AUTHORS AND DO NOT REFLECT THE OFFICIAL GUIDANCE OR POSITION OF THE UNITED STATES GOVERNMENT, THE DEPARTMENT OF WAR OR OF THE UNITED STATES AIR FORCE.



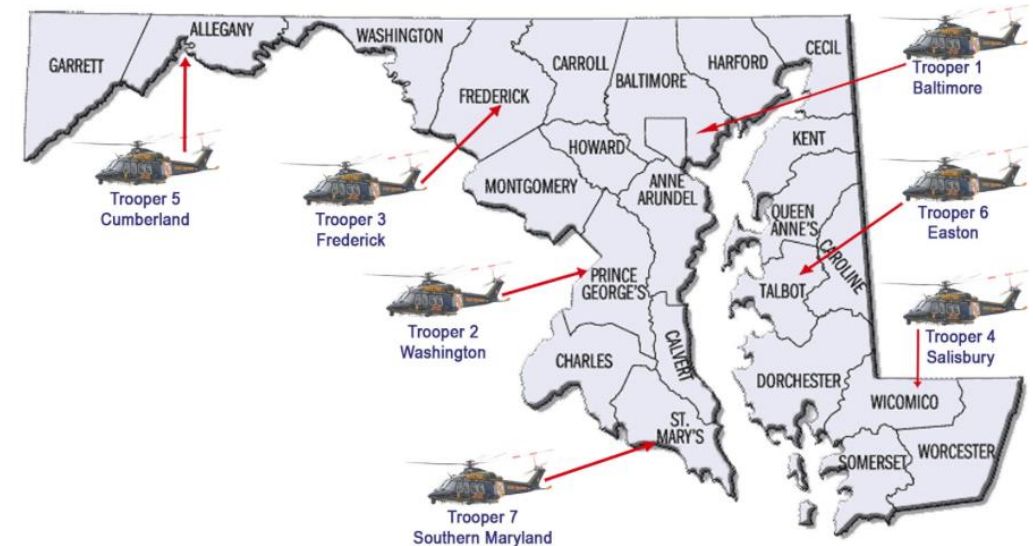
# BACKGROUND

- OFTEN A DISCONNECT FROM PREHOSPITAL (EMS) AND IN-HOSPITAL DATA
  - INFORMATION LOSS DURING HANDOFF
  - FAILURE TO LINK RECORDS
- LACK OF IMMEDIATE ACCESS TO PREHOSPITAL DOCUMENTATION



# BACKGROUND

- MARYLAND'S INTEGRATED EMS AND HOSPITAL TRAUMA SYSTEM
- STATE POLICE WITH AVIATION COMMAND ARE TRAINED PARAMEDICS
  - 7 BASES
  - PERFORM ALL PREHOSPITAL FLIGHTS ACROSS THE STATE
- R ADAMS COWLEY SHOCK TRAUMA CENTER
  - FREESTANDING TRAUMA HOSPITAL
  - 8000 TRAUMA ADMISSIONS PER YEAR
  - TRAUMA RESUSCITATION UNIT (TRU)= TRAUMA ED
  - C-STARS LOCATION
  - AFRL GSU





# BACKGROUND

- SURVEY OF TRU NURSES AND PHYSICIANS FOUND:
- MISSED DATA IN HANDOFFS
- OPPORTUNITY TO STREAMLINE PROCESSES WITH HIGHER FIDELITY PREHOSPITAL INFORMATION
- ABILITY TO IMPROVE AWARENESS OF PREHOSPITAL CARE



# SOLUTION: TROOPER TO TRU

- **LET'S PLACE BATDOK ON MARYLAND STATE POLICE HELICOPTERS AND STREAM VITALS AND LIFE-SAVING INTERVENTIONS TO THE GROUND PRIOR TO ARRIVAL**
- SUPPORT FROM AFRL, C-STARS, MSP, UMSOM, SHOCK TRAUMA
- PHASE I PROPOSAL FOR A SCHOOL OF MEDICINE SHARK TANK COMPETITION
- SELECTION TO THE FINAL
- 3-MINUTE PITCH
- FIRST PRIZE AWARD



# DESIGN- OVERVIEW

- TEAM AWARENESS KIT (TAK) SERVER- SOM VM
- ATAK- FREE DOWNLOADABLE APP WITH VARIOUS SECURITY CERTIFICATES THAT TRACKS LOCATIONS AND PERSONNEL
- BATDOK- GOTS PREHOSPITAL ELECTRONIC HEALTH RECORD (EHR)



# DESIGN- TAK SERVER

- CLOUD BASED
- HIGH AVAILABILITY
- IN SOM HIPAA COMPLIANT ENVIRONMENT BUT OUTSIDE EPIC
- APPROVED BY ISO
- COMPUTING BUT NO STORAGE
- MANAGED BY STAPA (BEN AND JASON) AND BUILT BY BRIAN (SOM)
- SUPPORTS ATAK, ITAK, WINTAK AND CLOUDTAK
- SERVES AS THE INFRASTRUCTURE FOR ALL SENSORS, UAS, ROBOTICS, AND APPLICATIONS- ALLOWS FREEDOM TO ADD AND INNOVATE



# DESIGN- ATAK

- ANDROID TEAM AWARENESS KIT
- DEVELOPED FROM GOTS TACTICAL AWARENESS KIT- A 2010 AFRL INVENTION FOR AIR TO GROUND OPERATIONS
- UBIQUITOUS MILITARY USE- “AIR TO GROUND”
- GROWING CIVILIAN USE (COLORADO AND TEXAS, CBP)
- BATDOK PLUGIN FOR UNIFIED COMMON OPERATING PICTURE OF PATIENTS, MEDICS, AND STC

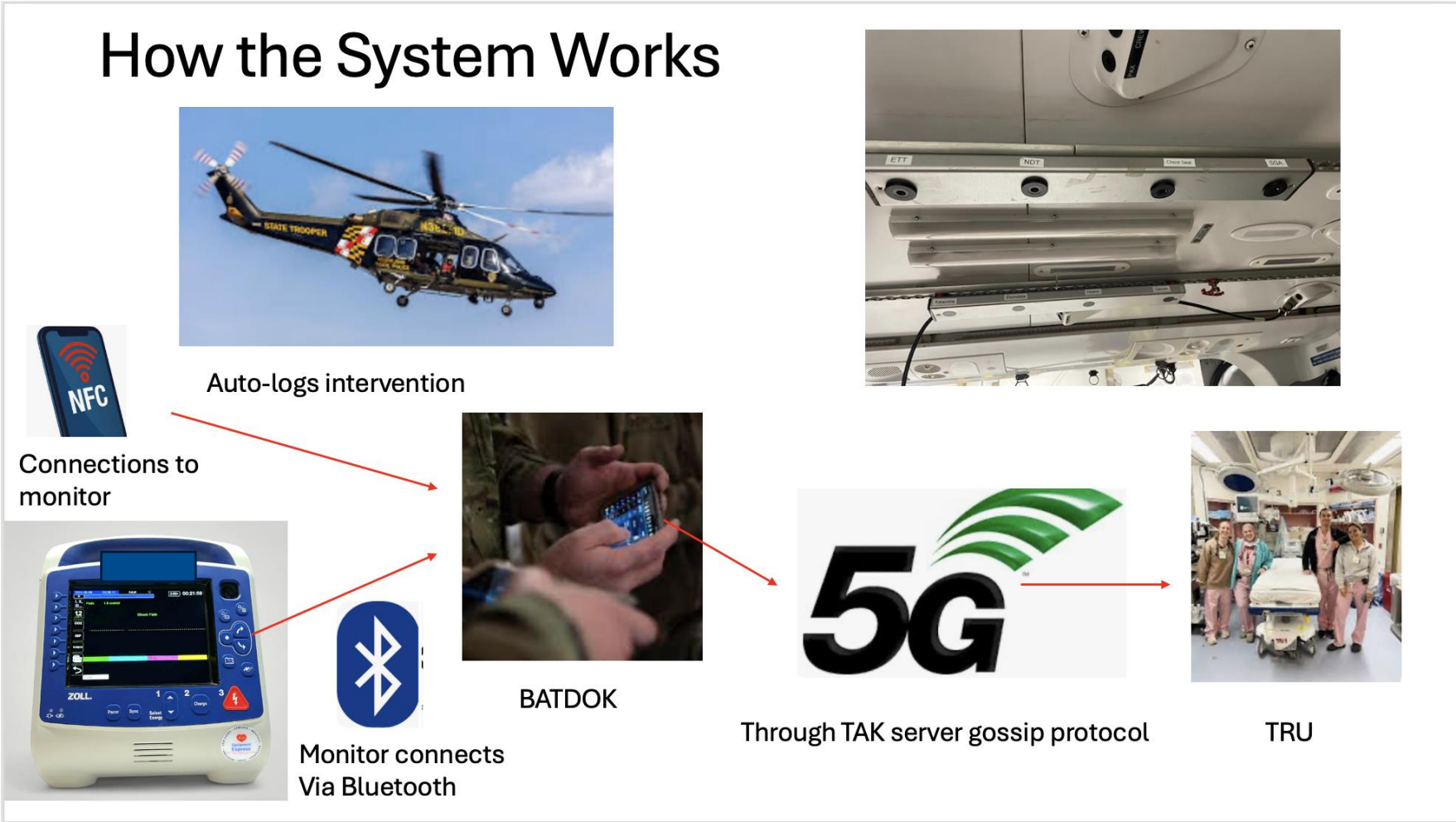


# DESIGN- BATDOK

- ANDROID AND IOS EHR APPLICATION GOTS PRODUCT FOR VITALS AND LIFE SAVING INTERVENTIONS CAPTURE
- INTEGRATES FULLY WITH ATAK
- RUNS ON OUR SYSTEM ACROSS A TAK SERVER GOSSIP PROTOCOL TO STREAM FROM THE HELICOPTER TO THE TRU



# INTEGRATED SYSTEM





# IMPLEMENTATION

- PILOT TESTING DURING OPERATION HARBOR SHIELD- SEPT 30, 2025
- STARTED AT ONE BASE: TROOPER 1
- TROOPER TRAINING JANUARY, FEBRUARY, 2026
- EXPANDED TO ALL 7 BASES WITH ANY FLIGHTS TRANSPORTING TO SHOCK TRAUMA FEBRUARY, 2026
- ANDROID PHONES ON TROOPER HELICOPTERS
- TABLETS FOR THE CHARGE NURSE AND PHYSICIANS IN THE TRU
- PRINT SHORT FORM ON ARRIVAL
- HAND OFF VIA QR CODE TO CHARGE NURSE TABLET PRIOR TO DEPARTURE





# SUCCESSFUL, HANDS-FREE VITALS STREAMING

- CONSISTENT AND SUCCESSFUL BLUETOOTH MONITOR TO BATDOK TO TRU
- ABILITY TO SEE REAL-TIME VITALS PRIOR TO TROOPER ARRIVAL
- CAN ADJUST TIME INTERVALS OF VITALS DISPLAY
- DISPLAYED IN SEVERAL DIFFERENT FORMATS FOR USER PREFERENCE

2:39 Tue, Sep 30  
mascal pt1  
TRP1

|         |            | Vitals |        |        |        |        | Labs   |        |        |          |
|---------|------------|--------|--------|--------|--------|--------|--------|--------|--------|----------|
| Injury  | Time       | 14:31  | 14:32  | 14:33  | 14:35  | 14:36  | 14:36  | 14:37  | 14:38  | More     |
|         | HR         | 110    | 97     | 115    | 99     | 221 ▲  | 116    | 117    | 183 ▲  |          |
| March   | BP         | 105/69 | 105/69 | 105/69 | 105/69 | 105/69 | 105/69 | 105/69 | 105/69 |          |
|         | Resp       |        |        |        |        |        |        |        |        |          |
| Observe | SpO2       | 96     | 94     | 96     | 97     | 97     | 96     | 98     | 96     | +        |
|         | AVPU       |        |        |        |        |        |        |        |        |          |
| Review  | GCS        |        |        |        |        |        |        |        |        |          |
|         | PAIN SCALE |        |        |        |        |        |        |        |        | Auto Log |

6:16 Sun, Jun 14  
Trooper\_1\_63  
STC DOC

|         |      | Vitals |       |        |          |
|---------|------|--------|-------|--------|----------|
| Injury  | Time | 05:42  | 05:52 | 06:02  | More     |
|         | HR   | 102    | 105   | 103    |          |
| March   | BP   | 87/60  | 89/63 | 129/80 |          |
|         | Resp | 0 ▲    | 0 ▲   | 33 ▲   |          |
| Observe | SpO2 | 85 ▲   | 80 ▲  | 81 ▲   | +        |
|         | AVPU |        |       |        |          |
| Review  | GCS  |        |       |        |          |
|         | Pain |        |       |        | Auto Log |

1:46 Tue, Sep 30  
Tac Medic\_31  
TRP1

|         | Summary       |      | Events                                     |            |   |
|---------|---------------|------|--------------------------------------------|------------|---|
| Injury  | Sep 30, 13:42 | TRP1 | Added Treatment Chest Seal: Right Back     | Treatments |   |
|         | Sep 30, 13:42 | TRP1 | Removed Treatment Chest Seal: Left Front   | Treatments |   |
| March   | Sep 30, 13:42 | TRP1 | Removed Treatment Chest Seal: Right Back   | Treatments |   |
|         | Sep 30, 13:43 | TRP1 | Logged Vital: BP: 142/83; HR: 97; SpO2: 95 | Vitals     |   |
| Observe | Sep 30, 13:44 | TRP1 | Logged Vital: BP: 142/83; HR: 97; SpO2: 95 | Vitals     |   |
|         | Sep 30, 13:45 | TRP1 | Logged Vital: BP: 142/83; HR: 98; SpO2: 96 | Vitals     |   |
| Review  | Sep 30, 13:46 | TRP1 | Logged Vital: BP: 142/83; HR: 99; SpO2: 95 | Vitals     | + |



# SUCCESSFUL DOCUMENTATION OF LIVE-SAVING INTERVENTIONS

- MIST REPORTS
- TIME-STAMPED

8:11 Wed, Apr 22 Trooper 1.17

Summary Events

Injury Apr 22, 07:48 Logged Vital: EtCO2: 34; HR: 186; Resp: 17; SpO2: 87

Apr 22, 07:58 Trooper 1 Logged Vital: BP: 59/44; EtCO2: 41; HR: 110; Resp: 11; SpO2: 100

March Apr 22, 08:03 Trooper 1 Logged Medicine Blood Product: Low O Titer Whole Blood IV

Apr 22, 08:03 Trooper 1 Logged Medicine Blood Product: Low O Titer Whole Blood IV

Observe Apr 22, 08:04 Trooper 1 Logged Medicine Other: Calcium Chloride IV 1.0 gm

Apr 22, 08:04 Trooper 1 Added Treatment ET-Tube

Apr 22, 08:04 Trooper 1 Added Treatment NPA

Review Apr 22, 08:06 Trooper 1 Logged Vital: BP: 130/90; EtCO2: 34; HR: 126; Resp: 13; SpO2: 100

7:00 Sun, Jun 14 Trooper 4.13

Summary Events

Injury Disposition: Add Disposition

D&I Category: Add D&I Category

A/T: Age/06-13-2026 23:50Z

M: None

March I: Other

S: HR: 76, SpO2: 96, Resp: 17, BP: 127/70, EtCO2: 32

T: C-Collar x1, Line x1

Observe MEDS: 06-14-2026 06:51, Fentanyl, ---, ---

Review

10:00 Fri, Apr 24 Trooper 2.10

Summary Events

Injury Disposition: Add Disposition

D&I Category: Add D&I Category

A/T: Age/04-24-2026 13:51Z

M: Motor Vehicle Collision

March I: Laceration, Pain

S: BP: 167/78

T: MEDS: 04-24-2026 20:56, Fentanyl, IV, 100 mcg  
04-24-2026 21:03, Fentanyl, IV, 100 mcg

Observe

Review

10:57 Sat, Jun 13 Trooper 1.61

Summary Events

Injury Triage: Immediate

March MOI

Observe TBSA

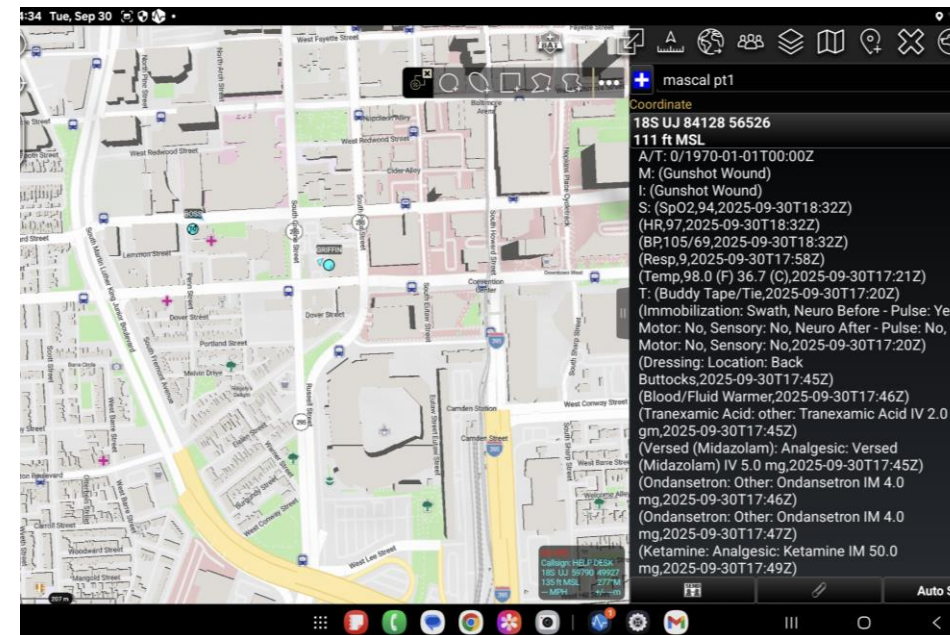
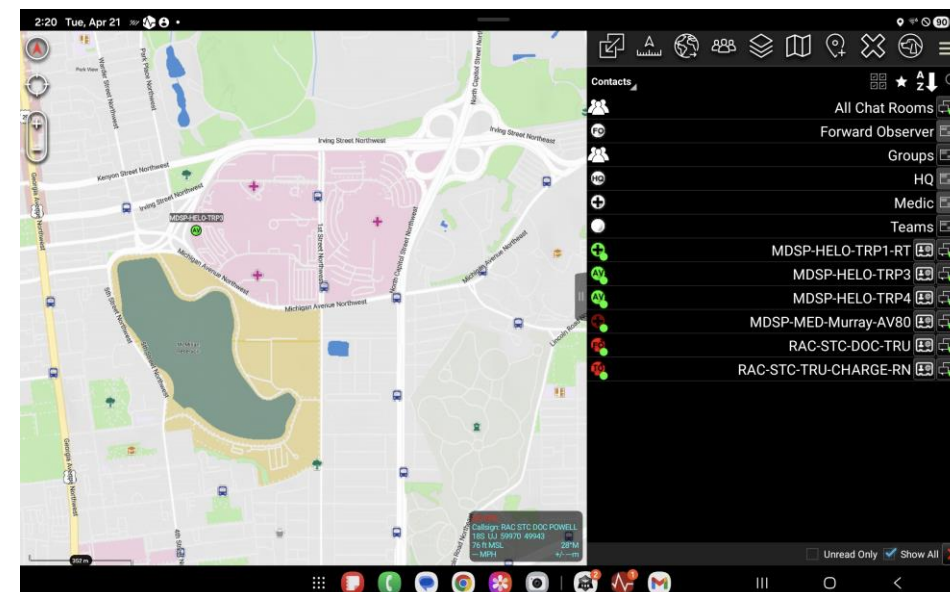
Review

Tap Injury



# PILOT ATAK INTEGRATION

- FOR GREATER SITUATIONAL AWARENESS, ATAK WITH BATAK PLUG IN WAS ALSO IMPLEMENTED
  - MIST
- ALLOWS FOR FOUNDATION FOR BROADER INTEGRATION WITH OTHER AGENCIES





# FUTURE INITIATIVES

- EHR INTEGRATION
- INCORPORATION WITH BATDOK IOS PLATFORM TO EXPAND AGENCY INVOLVEMENT
- EXPAND TO OTHER HOSPITALS



# CONCLUSIONS

- THIS PROJECT DEMONSTRATES THAT A TAK-BASED ARCHITECTURE INTEGRATING BATDOK CAN BE SUCCESSFULLY IMPLEMENTED IN A CIVILIAN PREHOSPITAL ENVIRONMENT THROUGH COORDINATED TECHNICAL INFRASTRUCTURE, TRAINING, AND OPERATIONAL COLLABORATION BETWEEN AVIATION ASSETS AND A RECEIVING TRAUMA CENTER
- REAL-TIME TRANSMISSION OF PHYSIOLOGIC DATA AND SHARED SITUATIONAL AWARENESS BETWEEN MSP AIRCRAFT AND THE TRU WAS FEASIBLE AND REPRODUCIBLE ACROSS MULTIPLE BASES, DIRECTLY ADDRESSING RECOGNIZED COMMUNICATION AND HANDOFF LIMITATIONS IN CURRENT PRACTICE



# THANK YOU!

- AFRL ERC
- AFRL SDC
- Maryland State Police and TFC Adam Murray
- Dean Gladwin and the UM School of Medicine
  - Shock Trauma Center
  - IT- Ben, Jason, Brian
  - Many others!