

March 23, 2021

# Revolutionizing Preventative Maintenance Checks and Services with Augmented Reality

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# Agenda

March 23, 2021

01. Need and Opportunity

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02. Solution Vision

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03. Development

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04. Demonstration

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05. Applications, Limitations & Future Work

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06. Q & A

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# Vehicle Maintenance and Multi-Domain Operations

- Vehicle maintenance is critical to Army operations
  - Increasingly so with emphasis on multi-domain operations (MDO)
- MDO requires wide range of Army & Joint capabilities
  - Land domain must be ready to deploy at a moment's notice
- MDO increases importance of mission ready and deployable vehicles



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# Preventive Maintenance Checks & Service (PMCS)

- Many existing maintenance processes are analog
  - Reliant on paper-based forms and manuals
- Example: PMCS
  - Dependent on potentially damaged or misplaced paper manuals
  - Limited visibility into vehicle maintenance history
  - Fault escalation relies on easily damaged, lost, or indecipherable forms

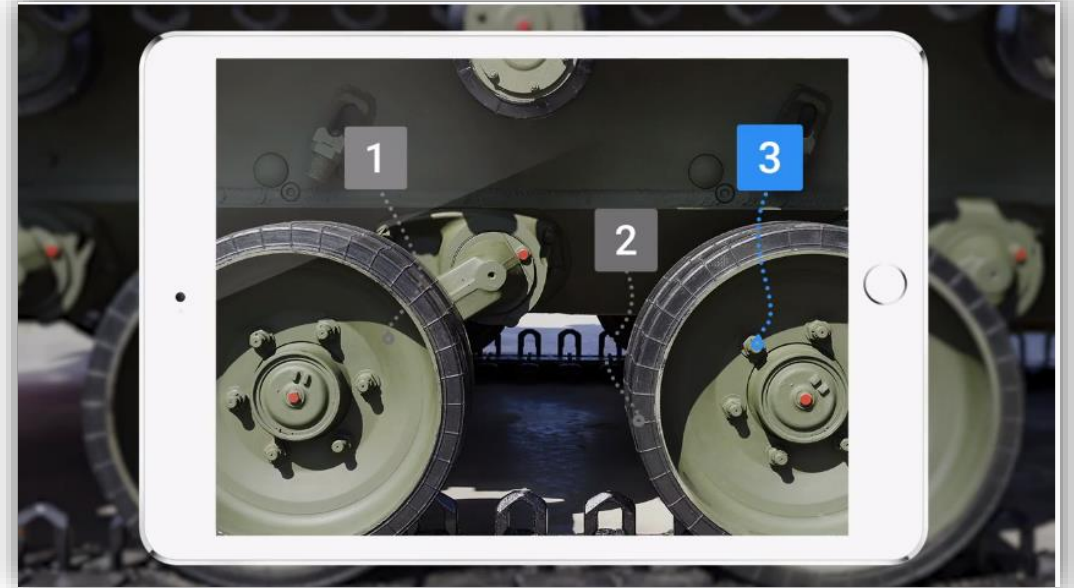
*The Battalion needs a way to aid PMCS and accelerate fault escalation from days to hours and minutes, getting vehicles up and running faster*



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# Augmented Reality (AR) as Enabling Technology

- AR has been shown to immensely benefit maintenance applications
  - Reduce errors, execution time, downtime, and cost
  - Increase productivity, efficiency, compliance, and readiness

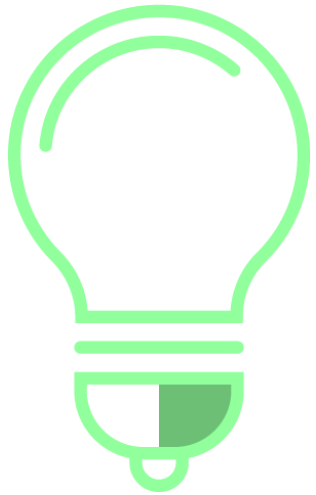


***Opportunity:*** Update paper-dependent PMCS to a digital AR platform, enabling efficiencies in *inspection*, *fault escalation*, and *validation* thereby *reducing PMCS from days to hours and minutes*



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# Digital Repair, Inspection, Validation Environment (DRIVE)



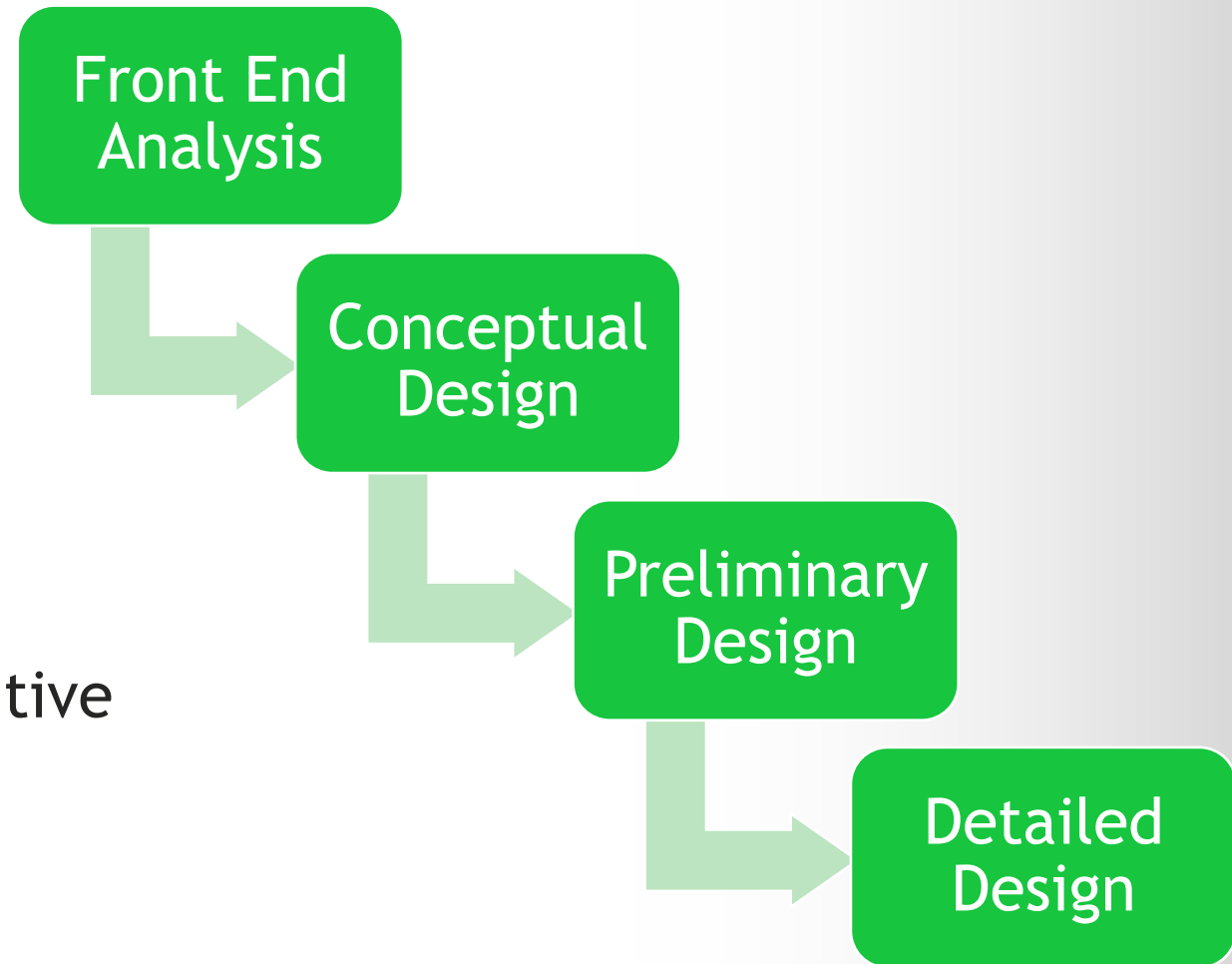
- Soldier-inspired solution providing 21<sup>st</sup> century update to PMCS
- End-to-end AR solution providing vehicle history, digital fault escalation, and step-by-step procedural guidance
- DRIVE results in an expected **60% increase in efficiency** during individual inspections
- Designed to alleviate frustrations with paper-based processes
  - Introduces point-of-need AR support
  - ***Gets vehicles up and running faster***



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# Solution Development

- Employed a rigorous design
  - Ensured solution **empowered Soldiers**
- Key Activities:
  - Field Study conducted at Ft. Hood
  - End User Interviews
  - Application of Human Factors and Cognitive Science Principles
  - Low and High-Fidelity Mockups
  - Usability and End User Evaluations



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RECEIVE Support



IDENTIFY Faults



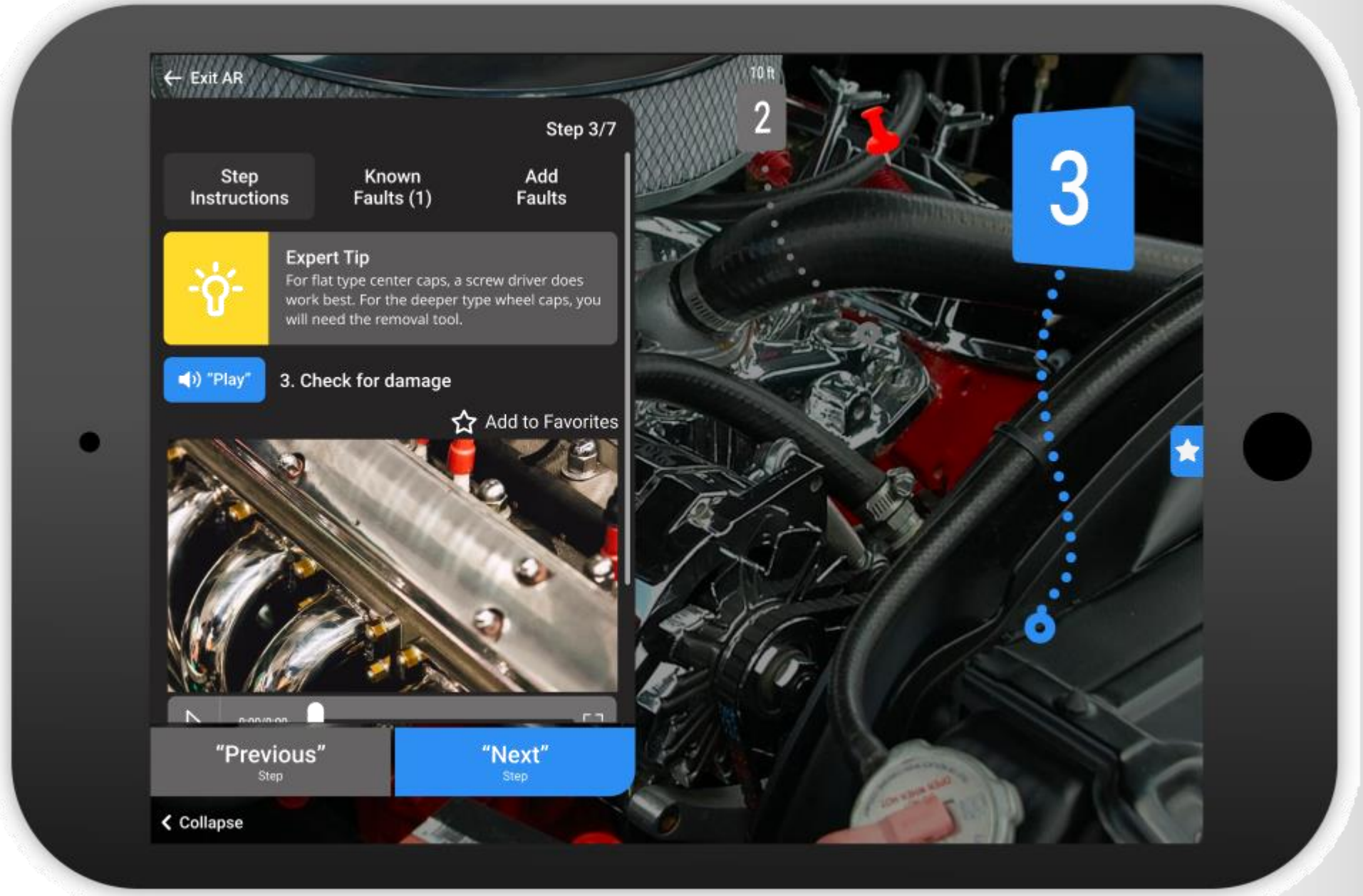
VERIFY Faults



VALIDATE Faults

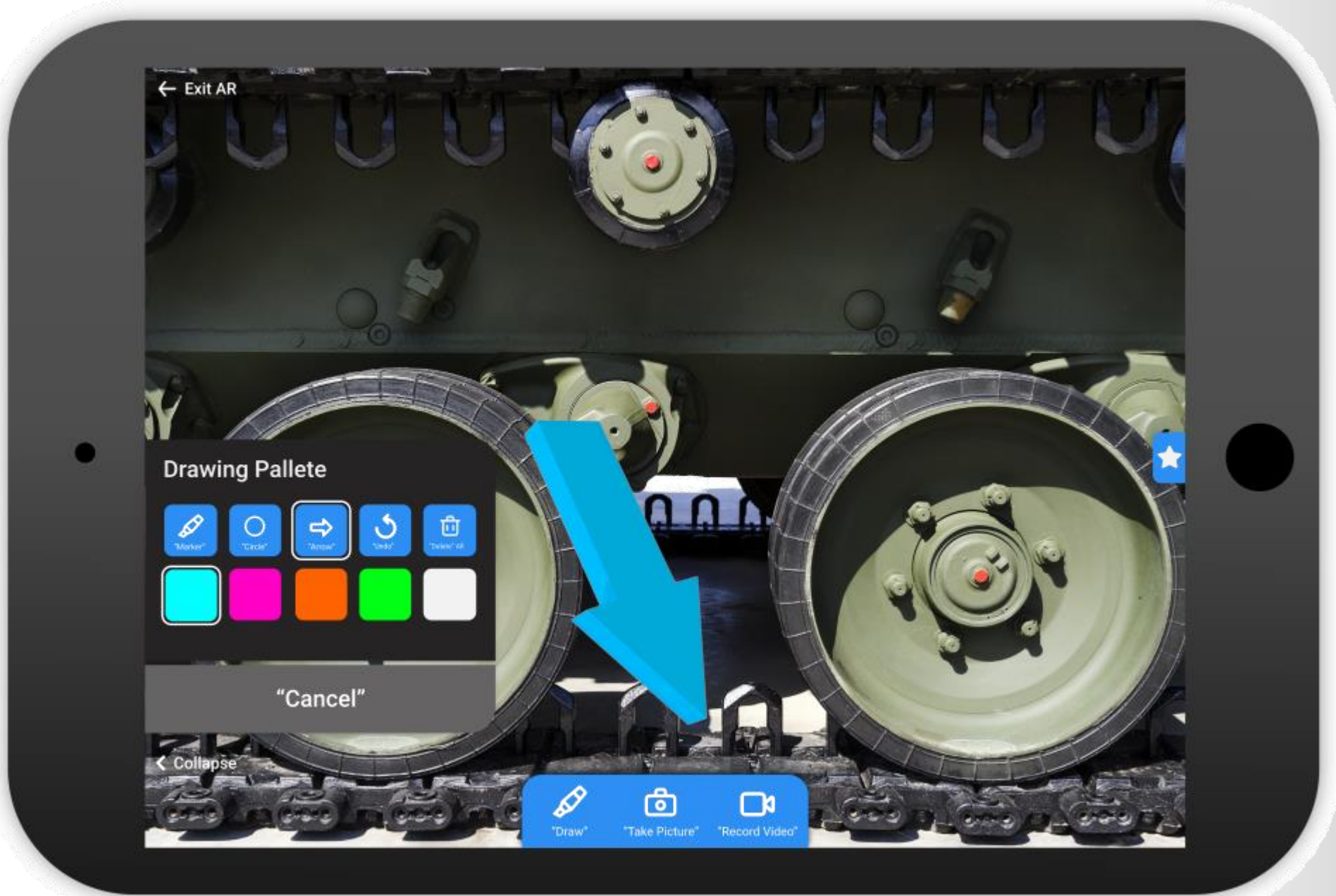
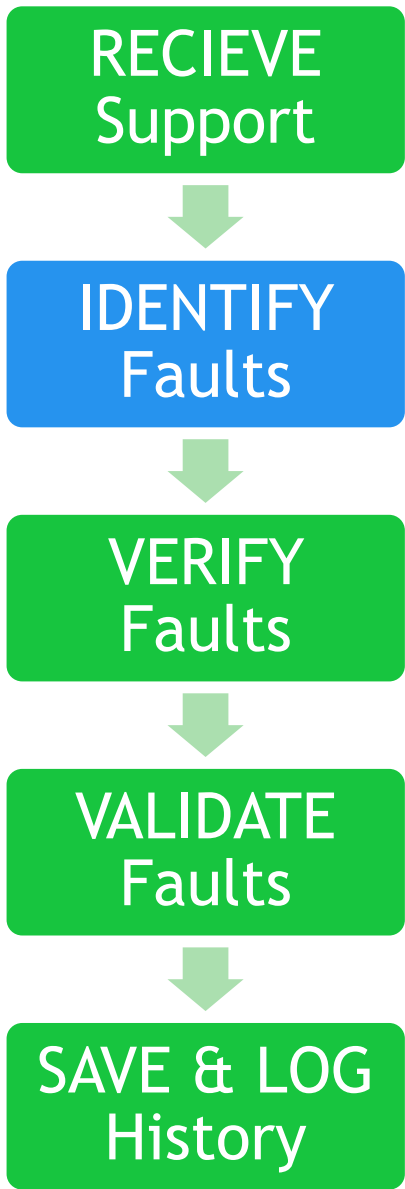


SAVE & LOG History

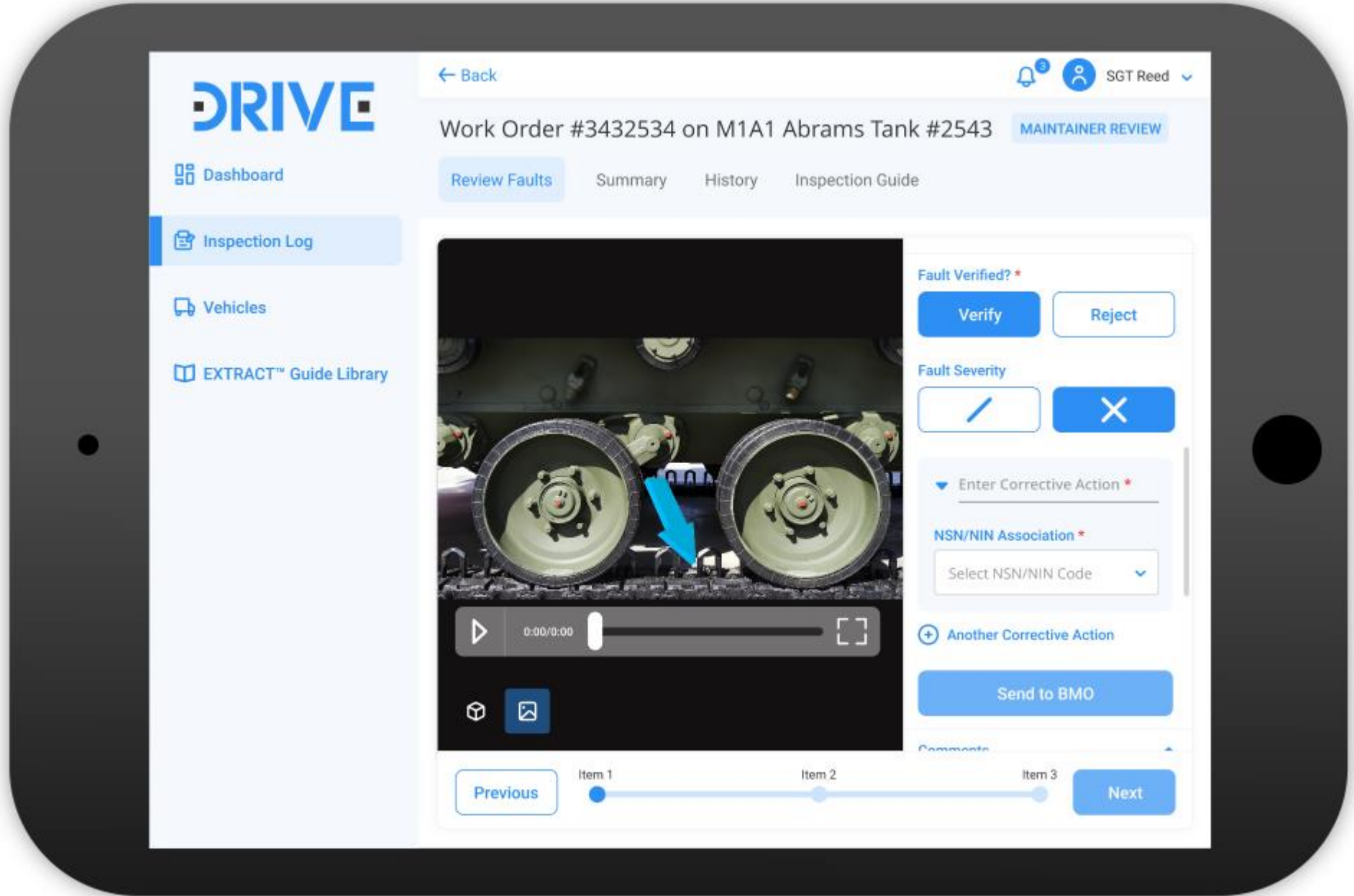
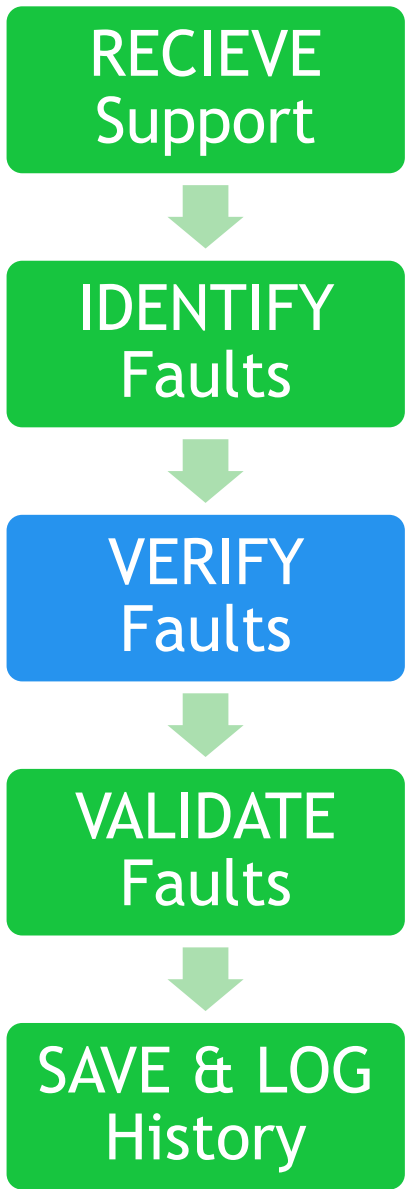


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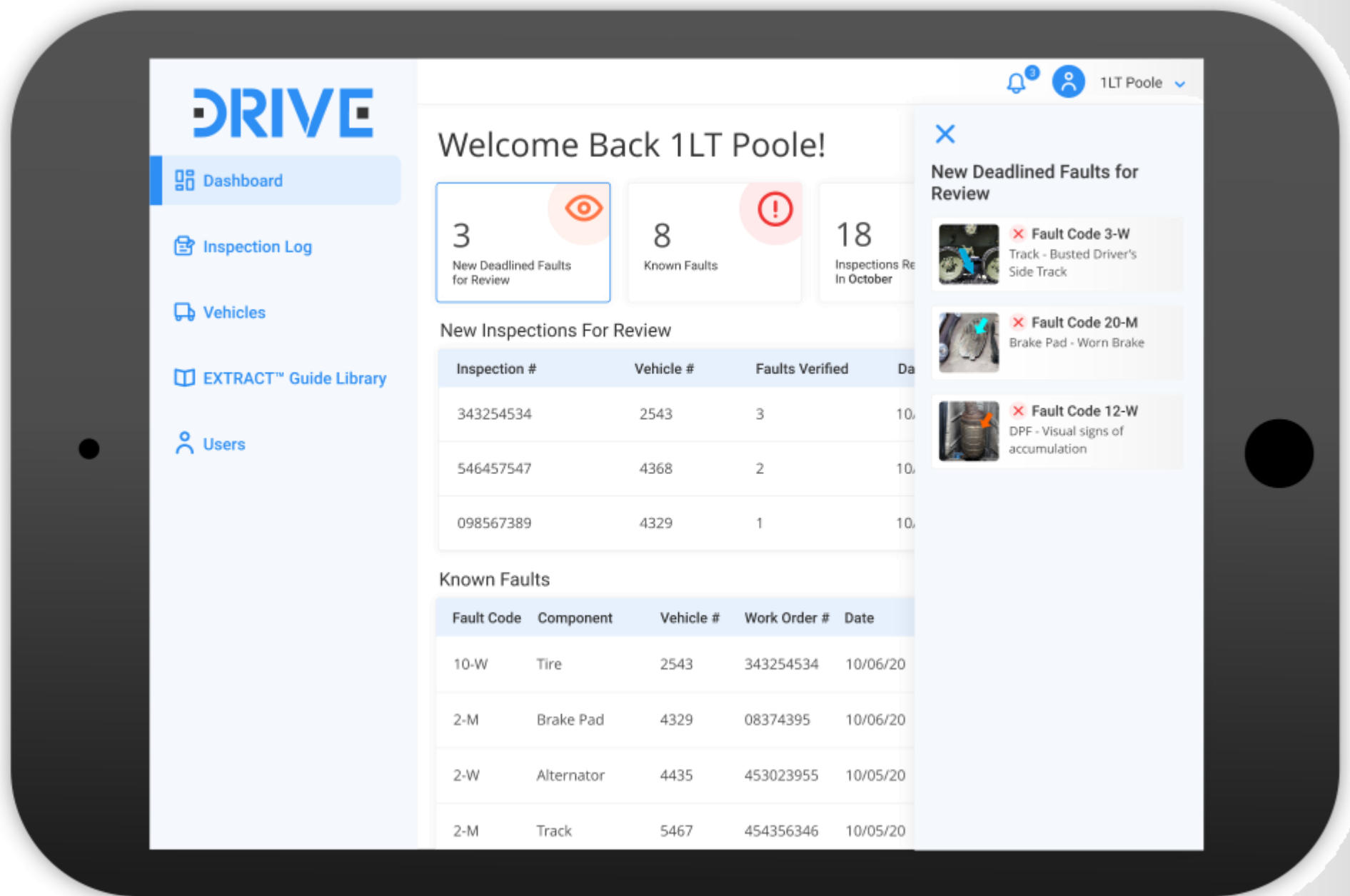
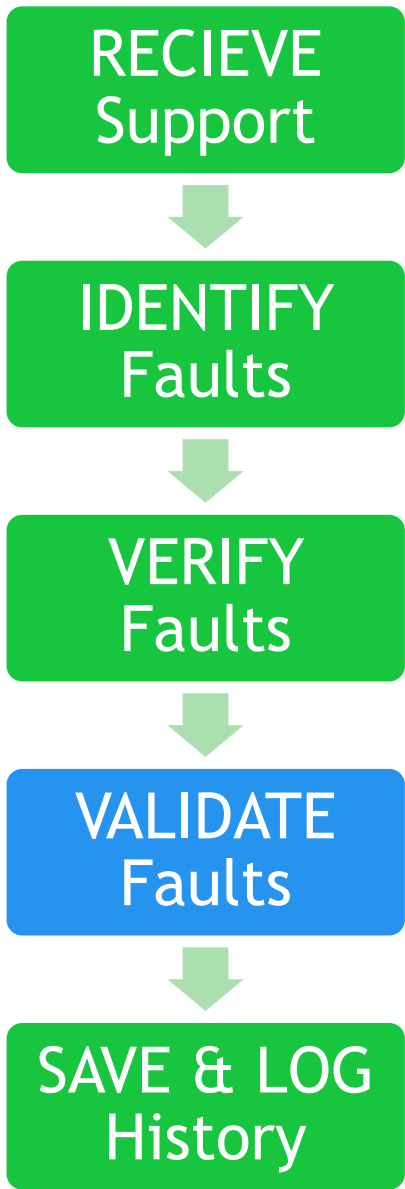




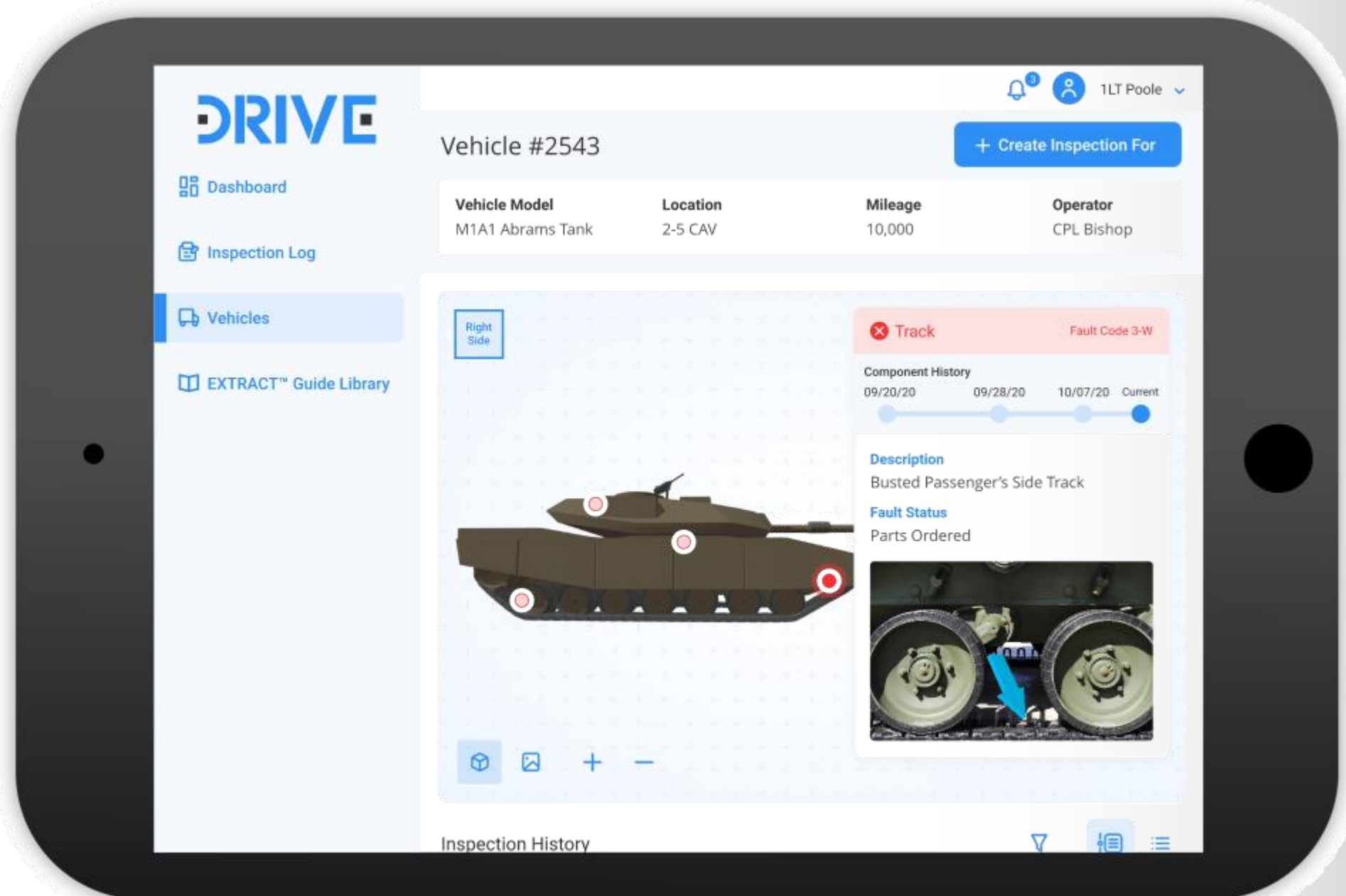
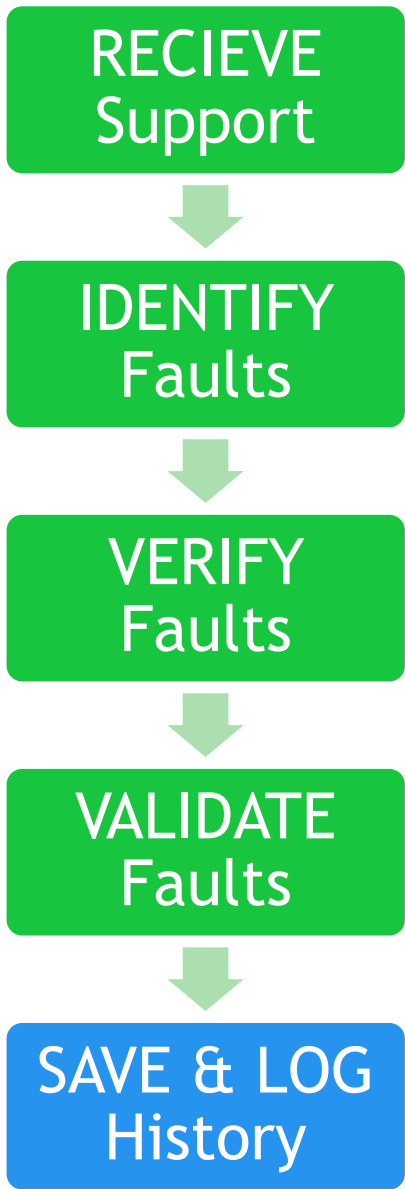
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# Applications, Limitations, and Future Work

- Applications
  - Army vehicle maintenance - PMCS
  - Commercial vehicle maintenance
  - Any maintenance area with need for fault escalation
- Limitations
  - Requires use of tablet
  - Integration with external systems
- Future Work
  - Full system implementation and on-site evaluation



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# Questions/Discussion



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# Contact Information

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