



Field-Level Maintenance Architecture (FLMA): A Lifecycle Systems Engineering Framework for AI-Enabled Army Field Maintenance

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Scope of this talk: project definition, needs analysis, and a candidate architecture. Not a fielded system.

Not a new problem: the execution layer was never built

Each reorganization changed the structure and the doctrine. None of them built the execution layer.

“...There is the need to ensure a combat ready atmosphere is consistently maintained within the platoon to prevent a “Joe’s Garage” syndrome...”

"Joe's Garage" in 1984.
ICBS in 2026. Same concern.

ARMOR, November-December 1984

1984

Division 86

Meant to fix: mechanics scattered under line companies, with the battalion motor officer (BMO) controlling very few of them. Consolidated into one platoon.

1990s

Force XXI

Meant to fix: an Army entering the Information Age without a shared battlespace picture. Digitize battle command and redesign how the force acquires, processes and shares information.

from
2004

Modularity

Meant to fix: brigades that could not deploy and sustain themselves. The brigade support battalion (BSB) becomes organic to the brigade and the forward support company (FSC) organic to the BSB. This is the structure the talk examines.

Still open

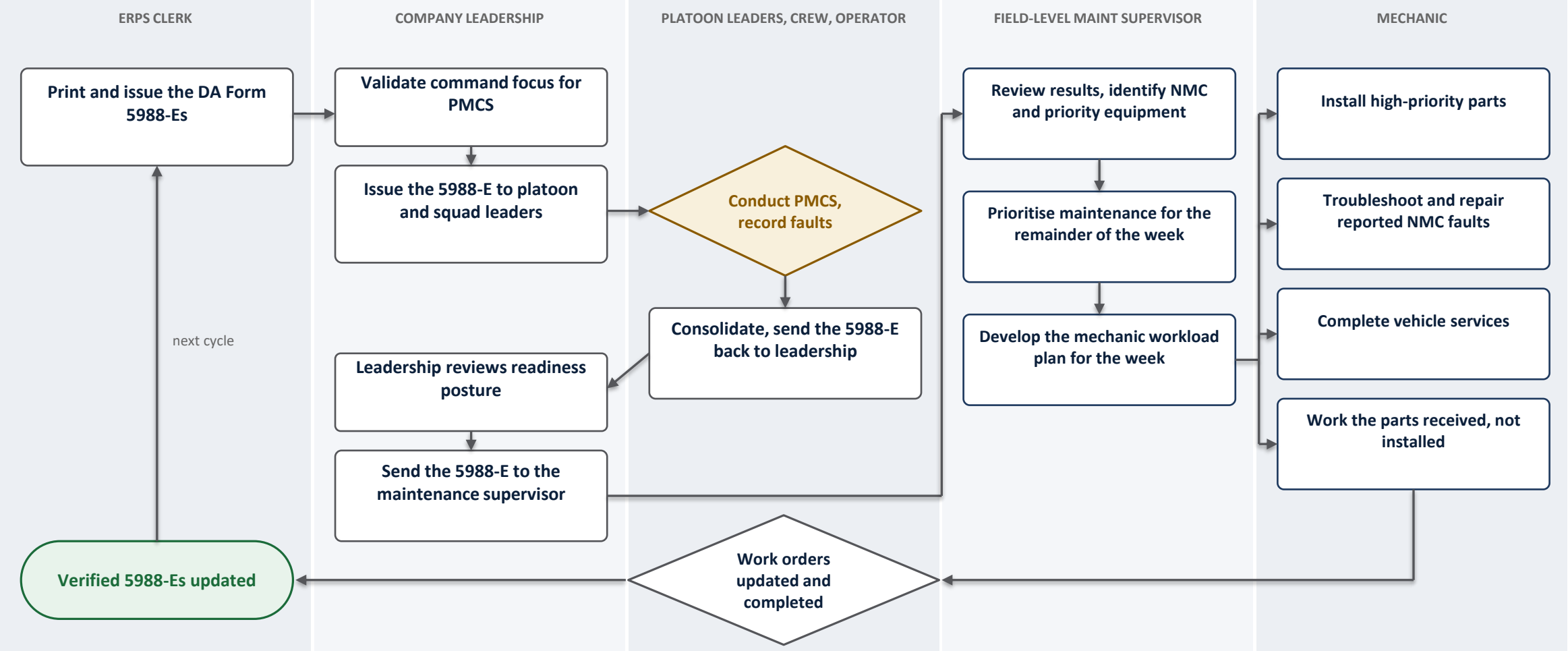
2026

All 11 Army vehicles the U.S. Government Accountability Office (GAO) reviewed show decreased mission capable rates since FY2015. None met the 90 percent goal in FY2024.

Doctrine changed every time. The execution layer did not.

A modern field maintenance system needs to be defined by how the work is performed at the lowest level.

The Preventive Maintenance Checks and Services (PMCS) cycle

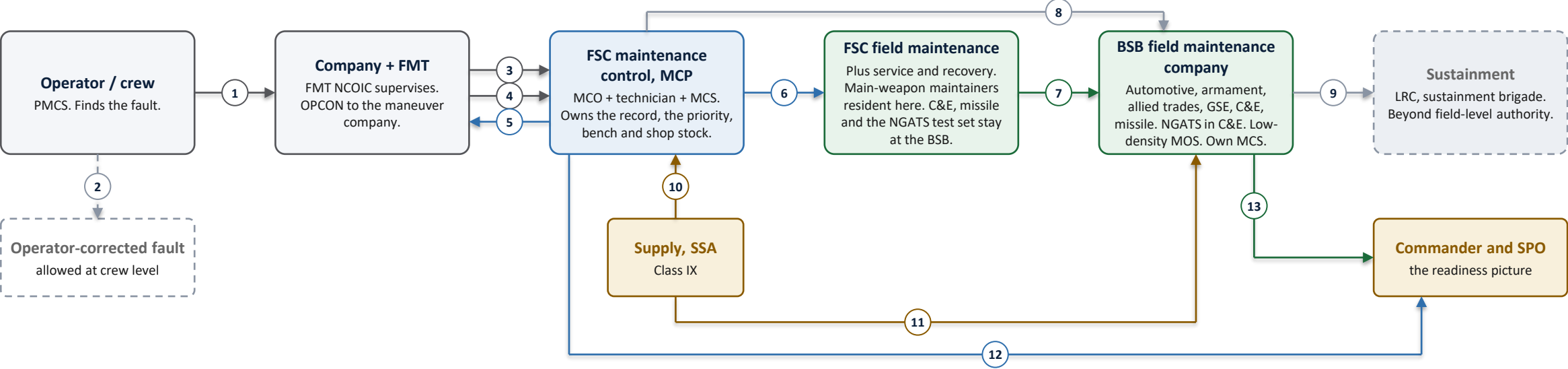


A modern field maintenance system needs to be time-sensitive.

Army field-level maintenance

This chart is the maintenance system, not the equipment.

"A bad system will beat a good person every time." W. Edwards Deming

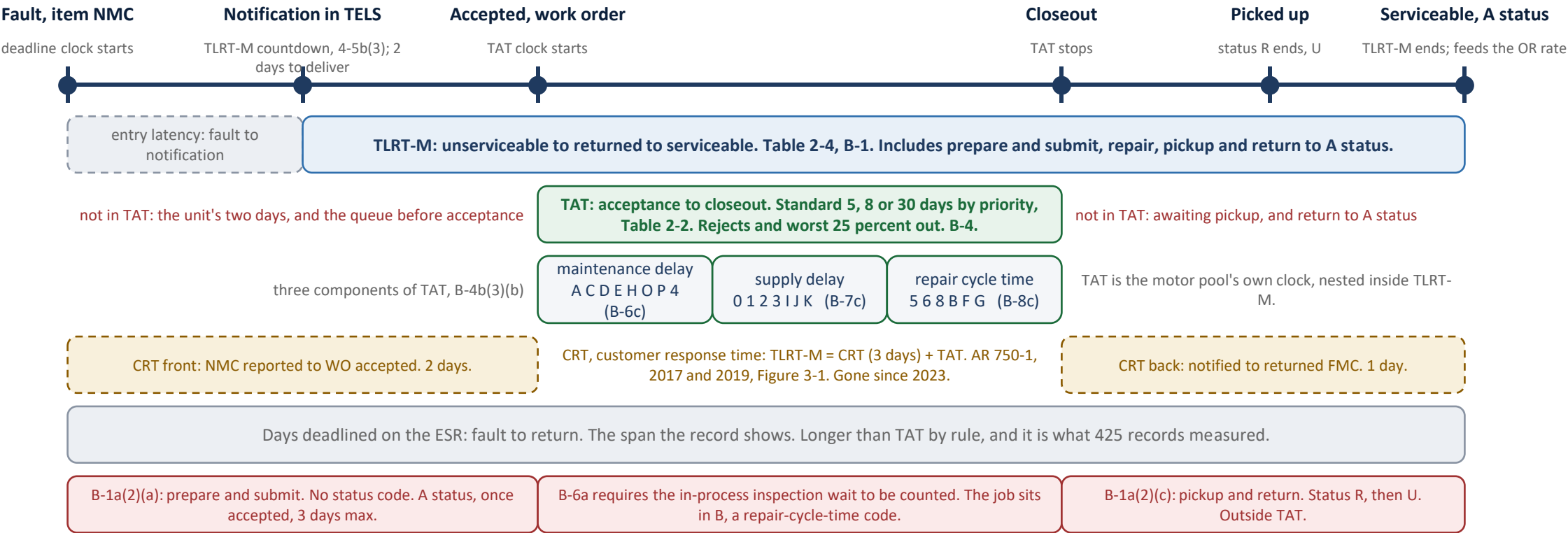


Flows

- | | | |
|--|---|---|
| 1 Data: fault and PMCS status, operator to company and FMT | 6 Activity and materials: work, and Class IX from bench and shop stock | 11 Materials: Class IX from the SSA to FMC shop stock |
| 2 Activity: operator-corrected fault, MAC C, when authorized | 7 Materials: C&E, missile, armament test work to the BSB; LRUs on NGATS | 12 Data: inspection findings and the ESR, to command |
| 3 Materials: equipment beyond on-site limits, to the MCP | 8 Materials and data: outside the battalion, routed through the BSB | 13 Data: shop status, FMC to command |
| 4 Data: work request and status updates | 9 Materials: BSB submits to the LRC or sustainment brigade | |
| 5 Activity: job assignment and dispatch, MCS to FMT | 10 Materials: Class IX from the SSA, only when not held in the BN | |

A modern field maintenance system needs to be decomposed into value streams and capabilities.

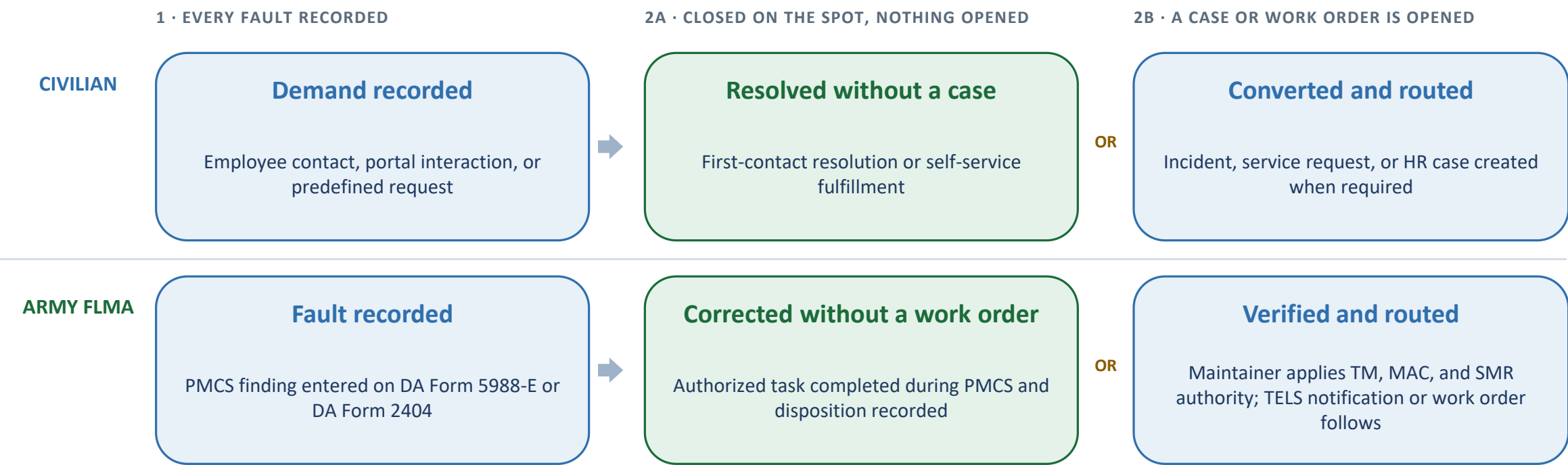
The loop, and what each measure covers



A modern field maintenance system needs to be interpretable to the Soldier who feeds it.

Every fault is demand. Not every fault is a work order.

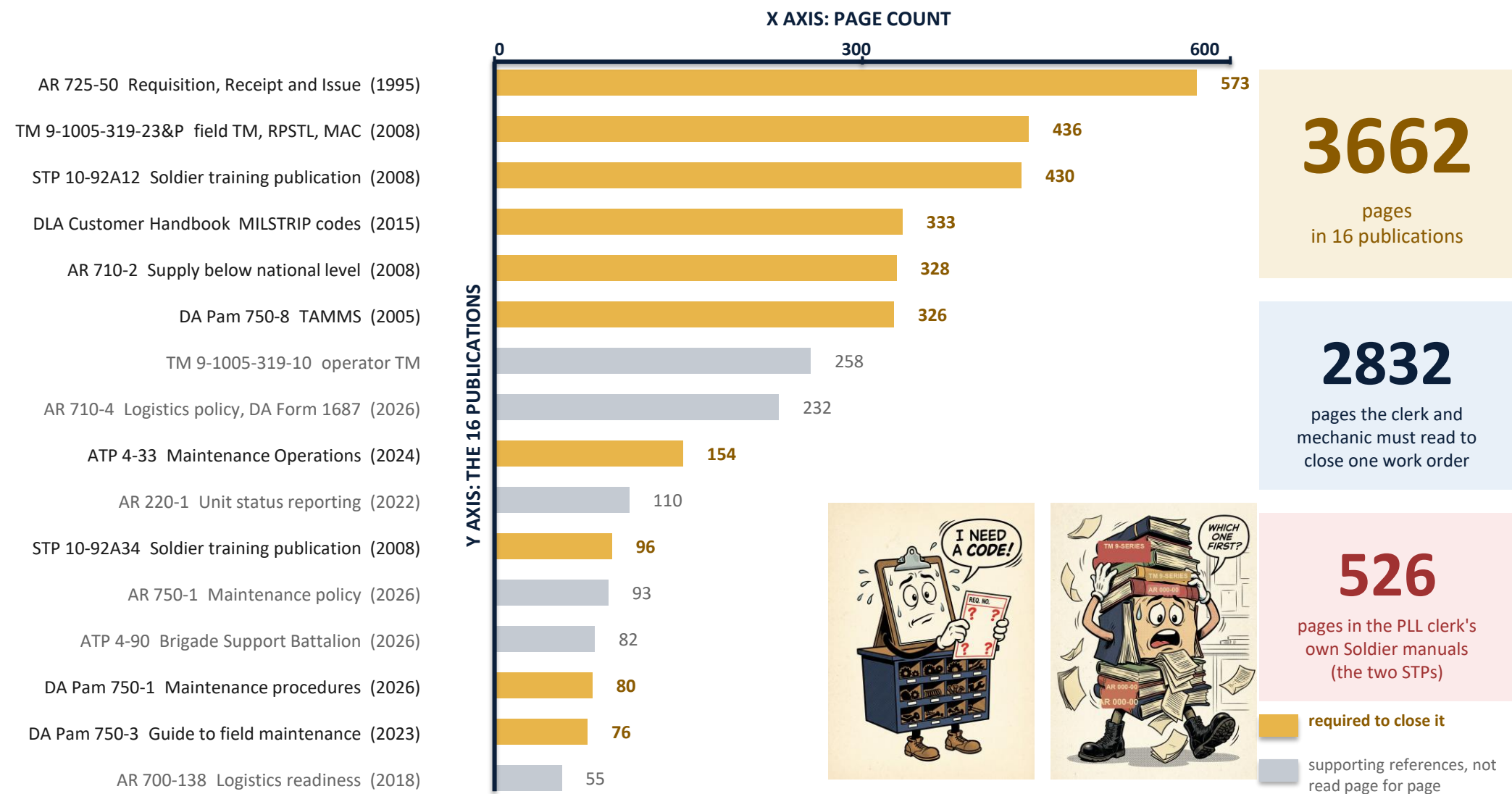
Civilian service management tracks the interaction before deciding whether it becomes a case or incident.



3 · BOTH PATHS MEASURED, ONE LAYER FOR BOTH SIDES

A modern field maintenance system needs to be auditable: every fault counted as demand, not just the ones that become a work order.

What defines one work order for the clerk and the mechanic



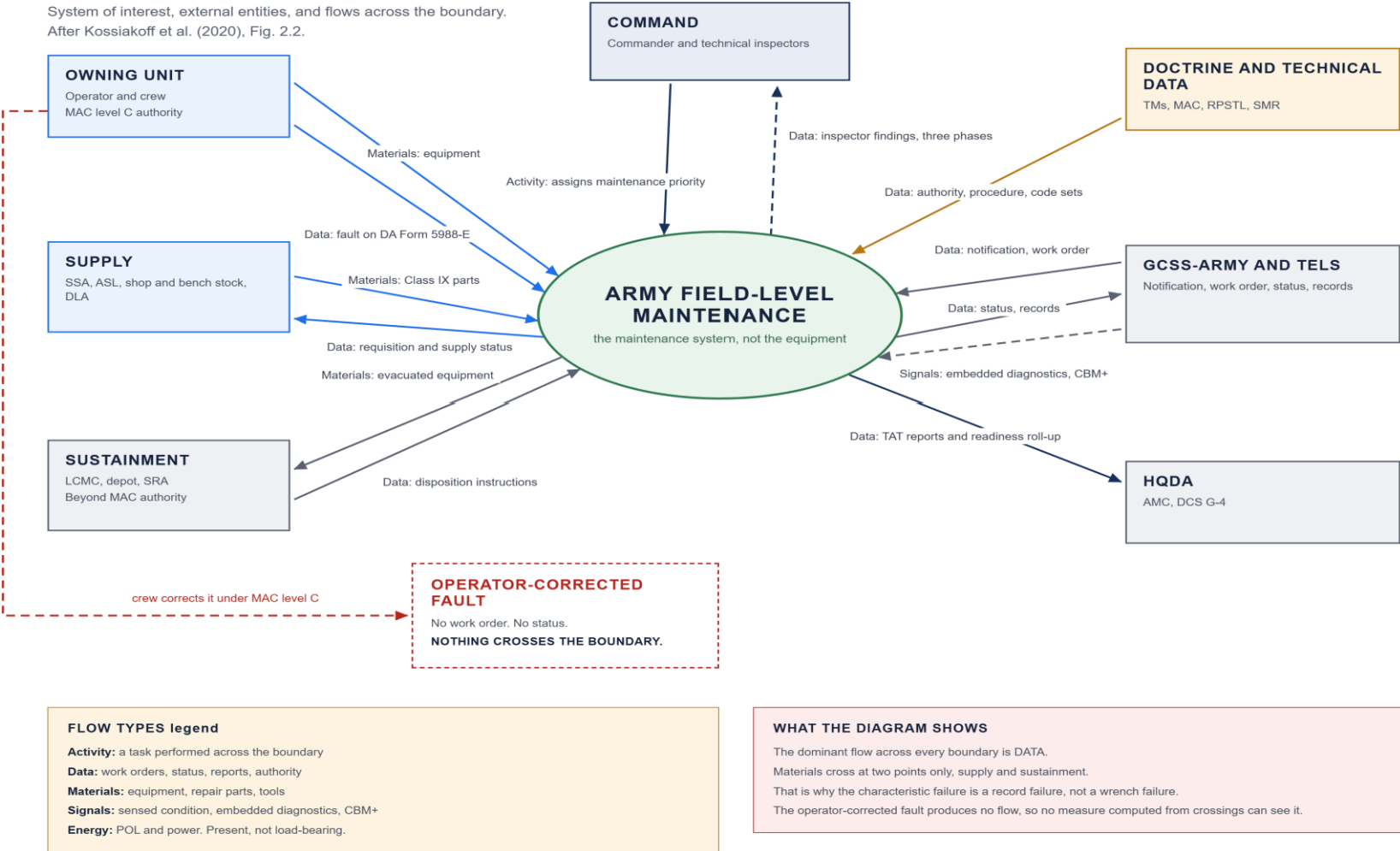
A modern field maintenance system needs to be user-friendly and accessible.

FLMA system definition

System of interest, external entities, and flows across the boundary.

Army field-level maintenance: context diagram

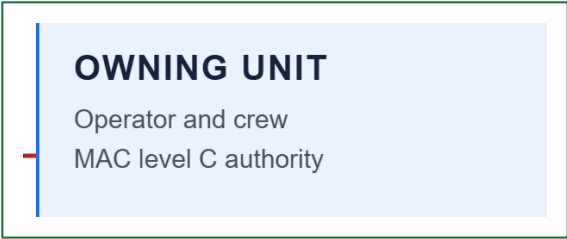
System of interest, external entities, and flows across the boundary.
After Kossiakoff et al. (2020), Fig. 2.2.



FLMA system definition

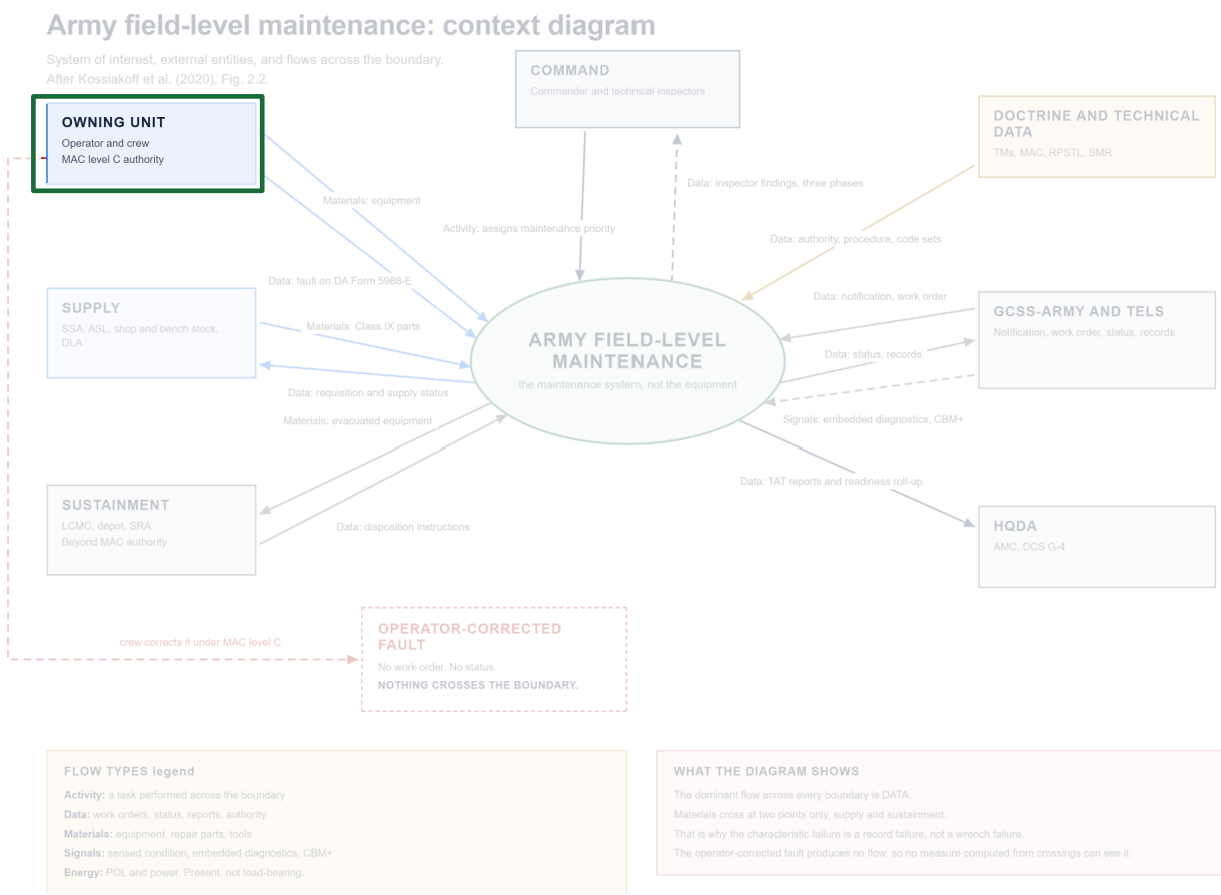
A modern field maintenance system needs to be traceable and verifiable.

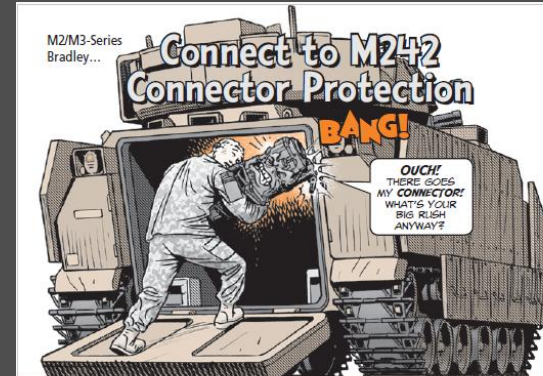
The crew finds the fault and holds authority to correct it.



Owning unit

The operator and crew hold MAC level C authority. They find the fault, and they correct part of it themselves. This is also where PMCS begins, and where the PLL clerk's interaction with the record starts: the clerk keys what the crew and mechanic report. Everything the system later measures starts here.





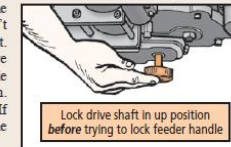
The Bradley's M242 gun is a giant of a weapon, but it definitely has an Achilles' heel: the feeder's 14-pin connector. Just a moment of carelessness can ruin the connector and that knocks out the M242.

The situation has gotten so bad that the Army is running out of M242 drive current motors.

So every Bradley unit needs to connect to these 14-pin connector precautions so they don't end up with NMC M242s:

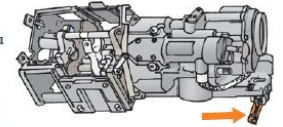
The connector is often damaged when the feeder is being positioned on the receiver because crews are doing timed drills and they haven't trained with the M242 in a long time. They rush things and BANG the connector is bent. To prevent that, do refresher training before doing timed drills. Let crews get used to putting the feeder on the receiver before starting the stopwatch.

The connector is also damaged when crews try to lock the feeder on the receiver when the feeder's not positioned correctly. Avoid that by first pushing up the vertical drive shaft before trying to lock the feeder in place. If the drive shaft won't slide up, the feeder isn't positioned right. Reposition it and try again. Once the drive shaft is locked in place, the feeder handle should easily lock in the down position. If it doesn't, something is wrong. If you force the handle, you damage the connector. Tell your repairman.



When you remove the feeder, make sure its handle is in the down position before you lay the feeder on the ground. That protects the connector.

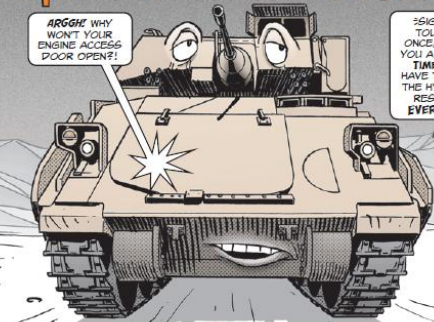
Put feeder handle down before putting feeder on ground



M2A2/M3A2, M2A2/M3A2 ODS, M2A3/M3A3 Bradleys, M3A3 FIST...

Open the Door to Reservoir PM

ARGG! WHY WON'T YOUR ENGINE ACCESS DOOR OPEN?



SMIRKS IF I TOLD YOU ONCE, I TOLD YOU A HUNDRED TIMES! YOU HAVE TO CHECK THE HYDRAULIC RESERVOIR EVERY DAY!

HAVING TROUBLE OPENING YOUR BRADLEY'S POWER UNIT ACCESS DOOR? YOU WILL IF YOU DON'T MAKE CHECKING THE HYDRAULIC RESERVOIR A PRIORITY.



PS MORE

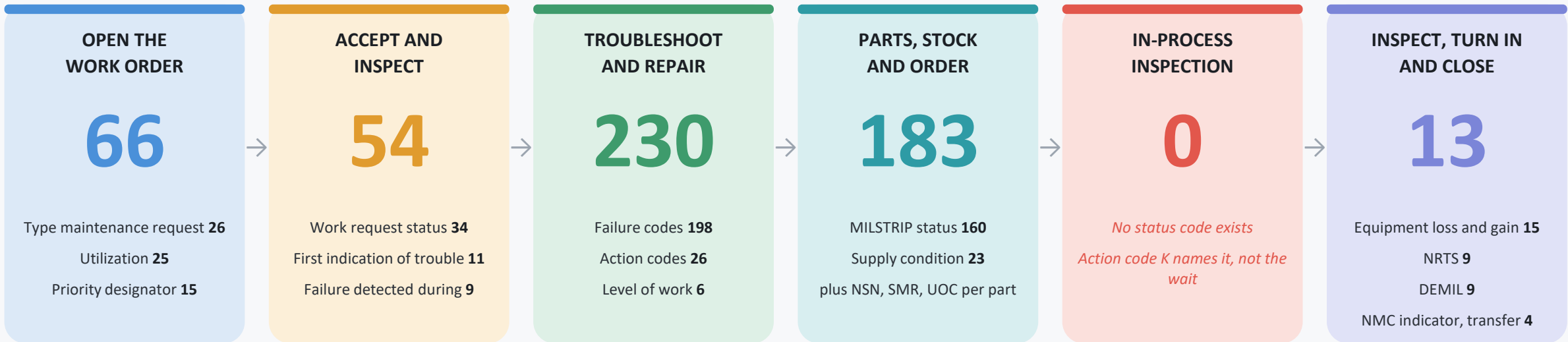
Keep This SMR Chart Handy!

JOINT SERVICE CODING				REFERENCE CHART			
SOURCE		MAINTENANCE		RECOVERABILITY			
1ST	2ND POSITION	3RD POSITION	4TH POSITION	5TH POSITION	6		
	Means of Acquiring Support	USE:	REPAIR:	DISPOSITION:			
P (Procured)	A ITEM: Stocked	Maintenance level and/or maintenance activity authorized to remove/replace the item.	Maintenance level and/or maintenance activity with capability to perform complete repair actions.	When unserviceable or uneconomically repairable, condemn or dispose.			
	B ITEM: Stocked, Insurance						
	C ITEM: Stocked, Deteriorative						
	D ITEM: Support, Initial Issue or Outfitting and Stocked Only for Additional Initial Issue						
	E EQUIPMENT: Support, Initial Issue or Outfitting and Stocked Only for Additional Initial Issue						
	F EQUIPMENT: Support, Non-Stocked, Centrally Procured on Demand						
	G ITEM: Stocked for Sustained Support, Uneconomical to Produce at Later Time						
	H ITEM: Stocked, Contains hazardous materials, Hazardous Materials Information System/Material Safety Data Sheet reporting required						
	R Terminal or Obsolete, Replaced						
	Z Terminal or Obsolete, Not Replaced						
K (Kit)	D ITEM: Depot on hand and Maintenance Kits	Both ashore and afloat	Ashore and afloat	Ashore and afloat			
	F ITEM: Maintenance Kit, Place at O,F,H,L						
M (Manufactured)	B ITEM: in Both Depot Repair & Maintenance Kits						
	O Manufacture (MFG) or fabricate (FAB) at Unit Level						
	F MFG OR FAB at intermediate/field level						
	H MFG OR FAB at intermediate/sustainment level						
	L MFG OR FAB at Specialized Repair Activity (SRA)						
	G MFG OR FAB Both Afloat and Ashore (Navy Only)						
A (Assembled)	D MFG OR FAB at Depot Maintenance Level	Installation/Field/ Sustainment or ashore	Installation/Field/ Sustainment or ashore	Installation/Field/ Sustainment or ashore			
	O ITEM: Assembled at Unit						
	F ITEM: Assembled at intermediate/field level						
	H ITEM: Assembled at intermediate/sustainment level						
	L ITEM: Assembled at Specialized Repair Activity (SRA)						
	G ITEM: Assembled Afloat and Ashore (Navy Only)						
X (Not Stocked)	D ITEM: Assembled at Depot Maintenance Level	Contractor Facility	Contractor Facility	Contractor Facility			
	A ITEM: Requisition Next Higher Assembly						
	B ITEM: Not Procured or Stocked. Available thru salvage. Requisition by CAGE/Part Number.						
	C Manufacturer/Installation Drawing, Diagram, Instruction Sheet. Identify by Cage/Part Number.						
	D Not Stocked. Obtain via Local Purchase.						
		Reference Only	Non-repairable	Non-repairable			
			Recondition	Nonrepairable, needs special handling			

PS MORE

The correct code, not a hunt through 570

A modern field maintenance system needs to be correct at the point of choice, not hunted for.



Bench stock is not a table.
It is a five-field test run per part.

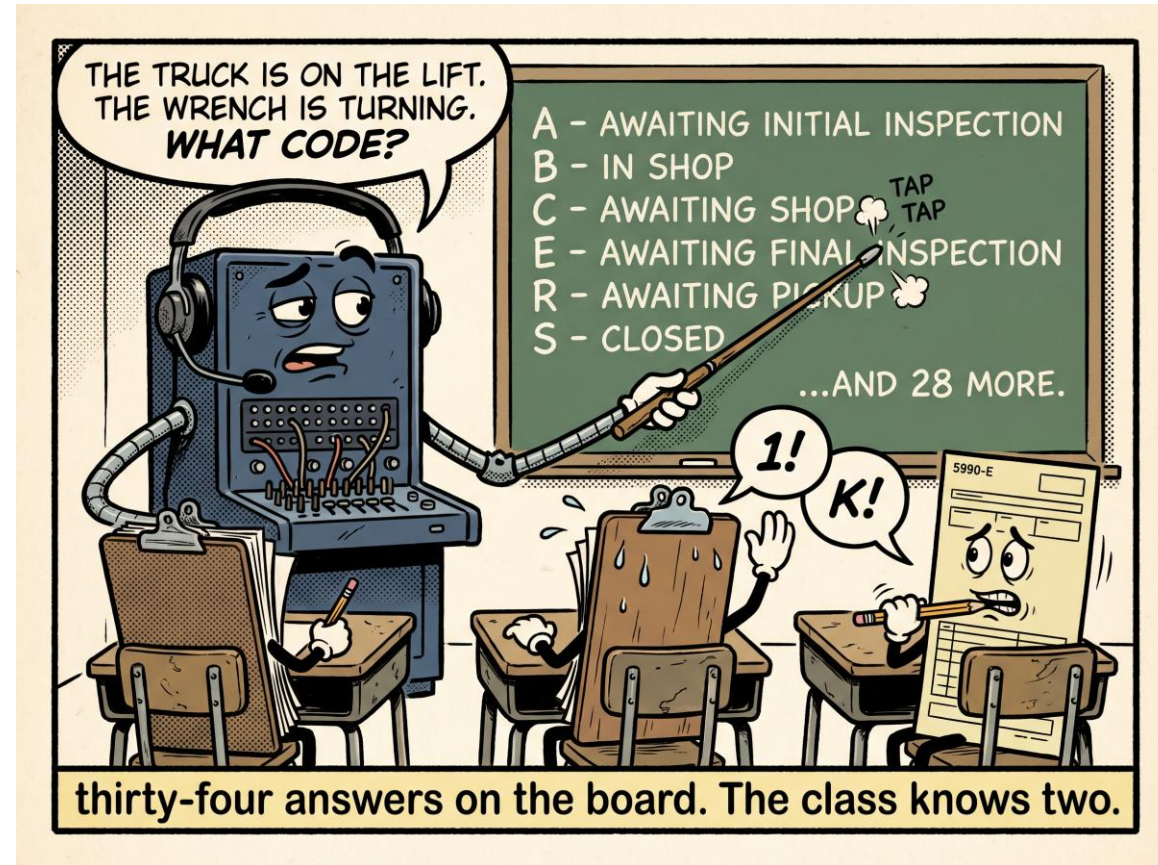
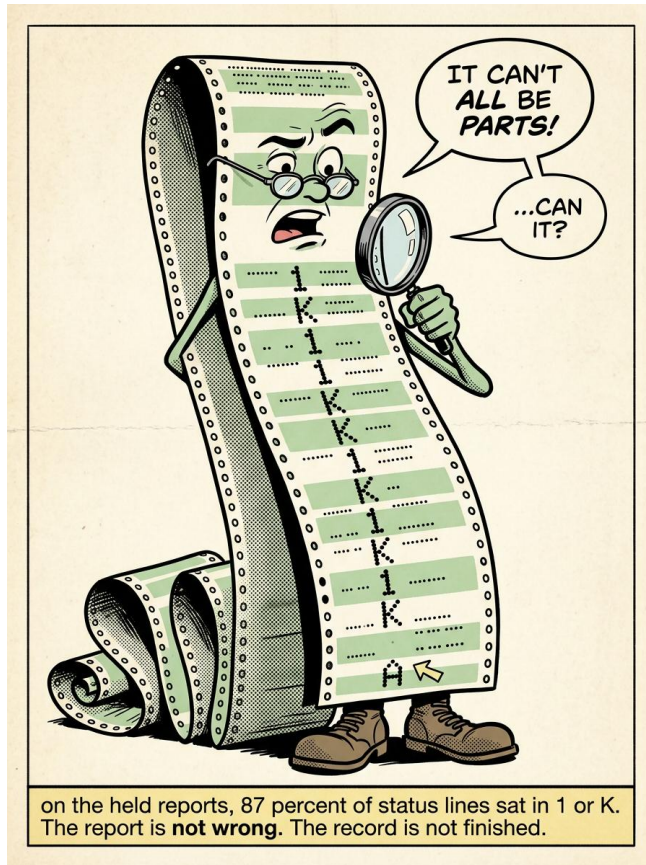
AR 710-2, 2-24c: an item qualifies only if CIIC = U or J, ARC = X, RC = Z, MATCAT position two = 2, and SCMC = 2, 33, 36, 4 or 9. Shop stock is demand-supported, so it is an analysis, not a lookup.

570 discrete codes across seventeen published code sets in three publications, before one equipment-specific SMR, UOC or NSN is looked up.

DA Pam 750-8	363
The DLA handbook	192
AR 725-50	15

One column is empty.
It is the one doctrine calls quality assurance and quality control.

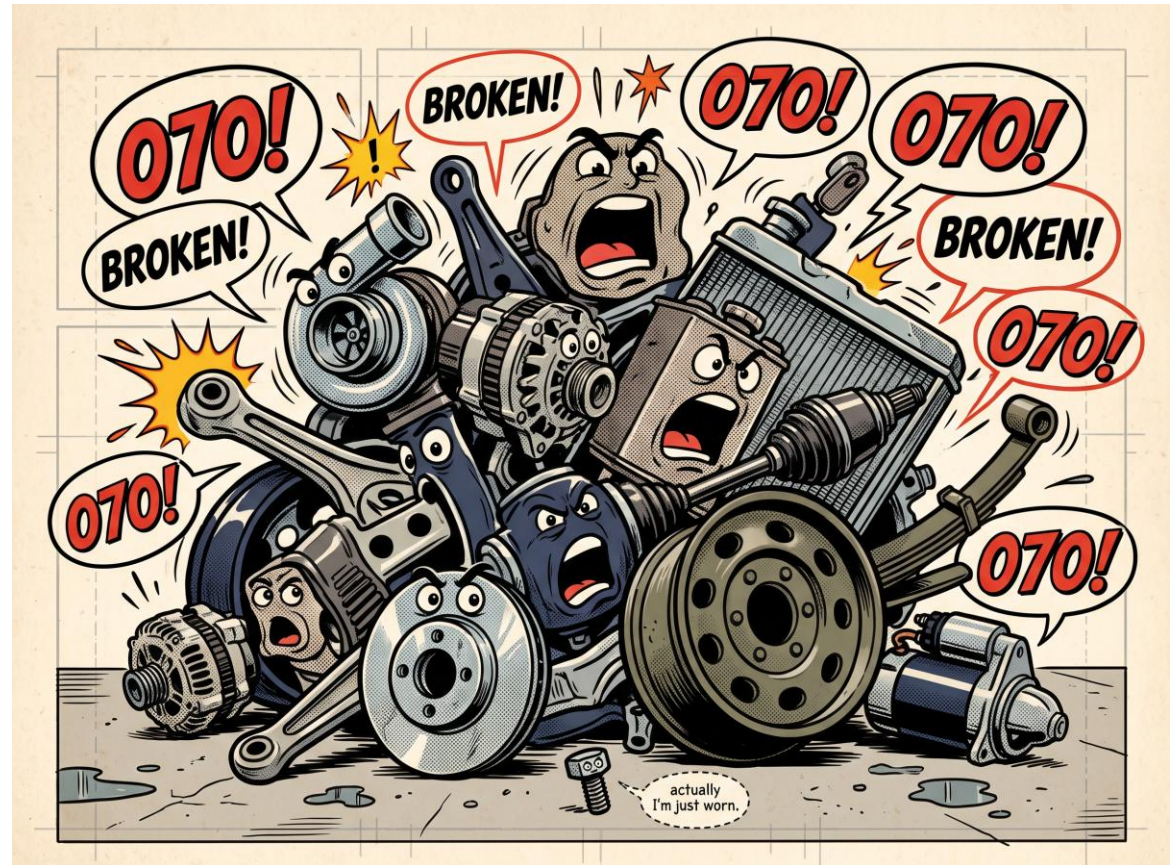
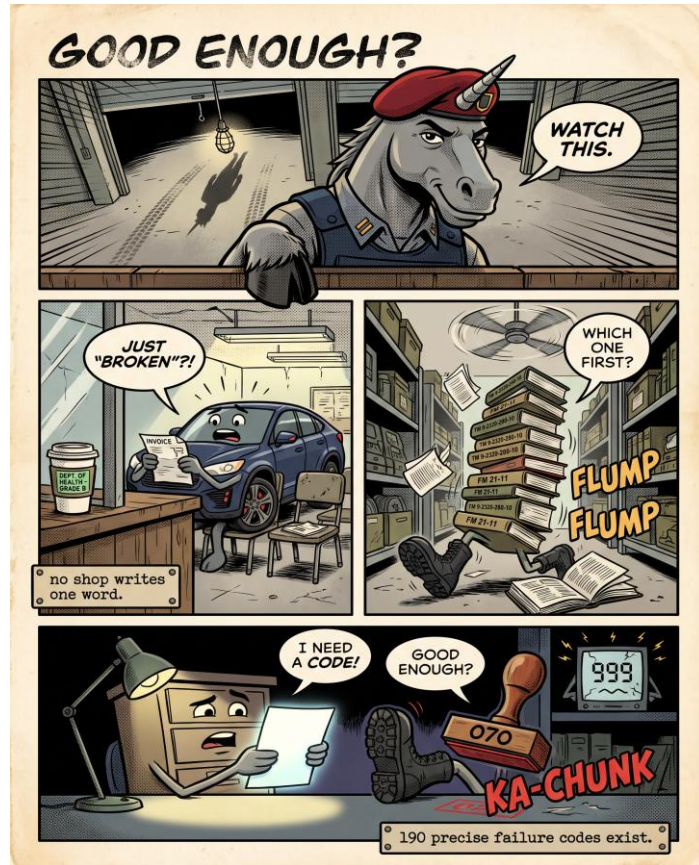
User stories



As the clerk, I want the correct status code, not the default, so the ESR tells the truth.
RIGHT: the code that matches what is actually happening in the bay, not 1 or K by habit.

A modern field maintenance system needs to be auditable.

User stories



As the mechanic, I want the failure code that matches what is actually broken, so parts and readiness data mean something.

RIGHT: worn, cracked, shorted, whichever is true. Not 070 by habit.

What FLMA proposes to do about it

Instrument first. Allocate AI after. Nothing in the AI layer is fielded.

Army doctrine already does the heavy lifting. It has the standard, the code, the answer, if a Soldier can find it. FLMA builds the record that connects the inspection, the code, and the time the clock leaves out today, and brings back the visibility doctrine lost when it dropped customer response time (CRT).

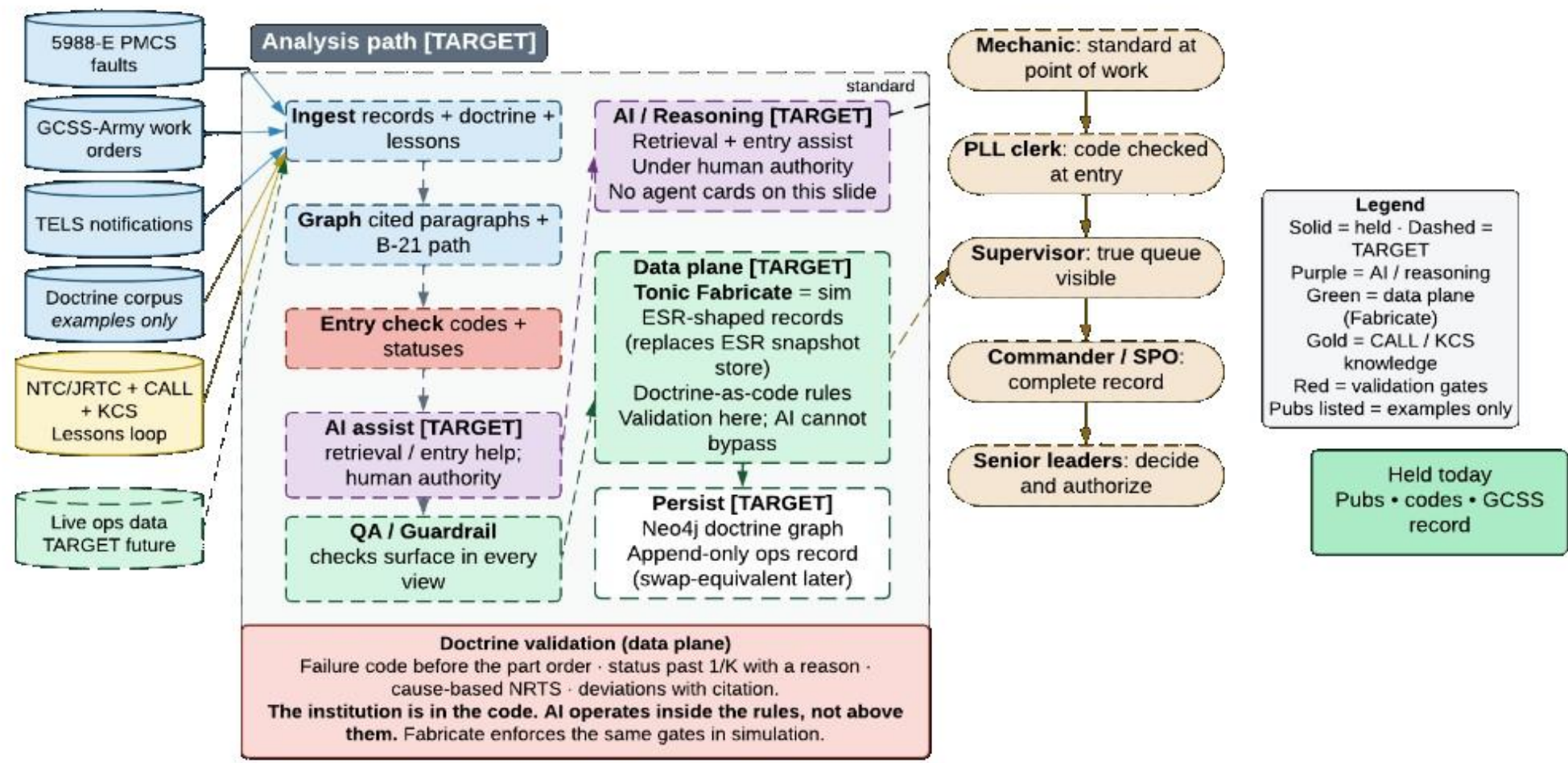
FLMA is the librarian: it puts that standard in front of the Soldier at the moment of need, in their own context, instead of sending them on a scavenger hunt. AI's job stays narrow. It helps a Soldier key the right code, and it helps a commander set the threshold for how long a delay can run before it triggers pass-back support. It does not decide. The warfighter still makes the call, now with what they need to make it an informed one.

The design maps the actual work at the FSC, the FMT, and the BSB, with eight bounded AI functions working inside it, every one supervised by a person. None of it is fielded.

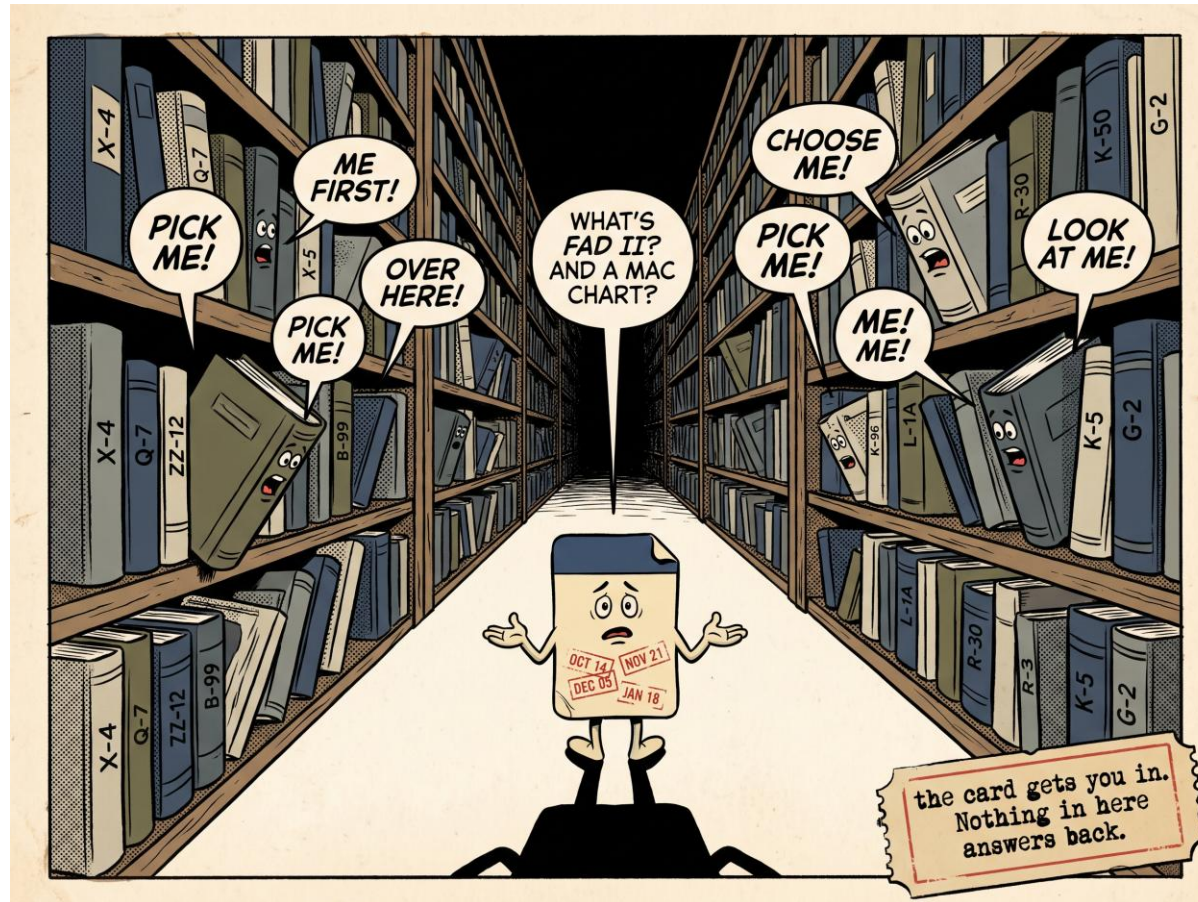
Instrument first, and AI earns its place second.

Where FLMA sits: the analysis environment

System of systems view: feeds, the analysis environment, and who each view reaches.

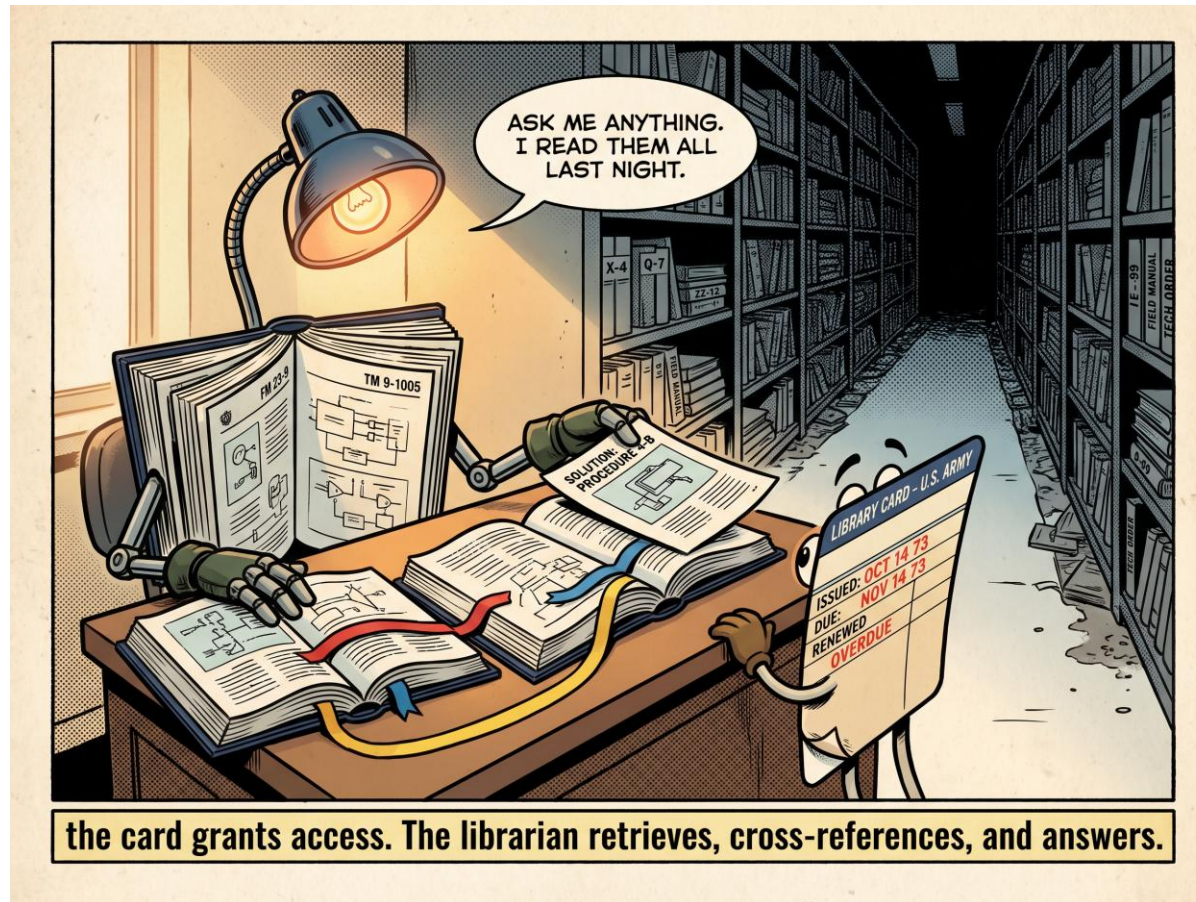


User stories



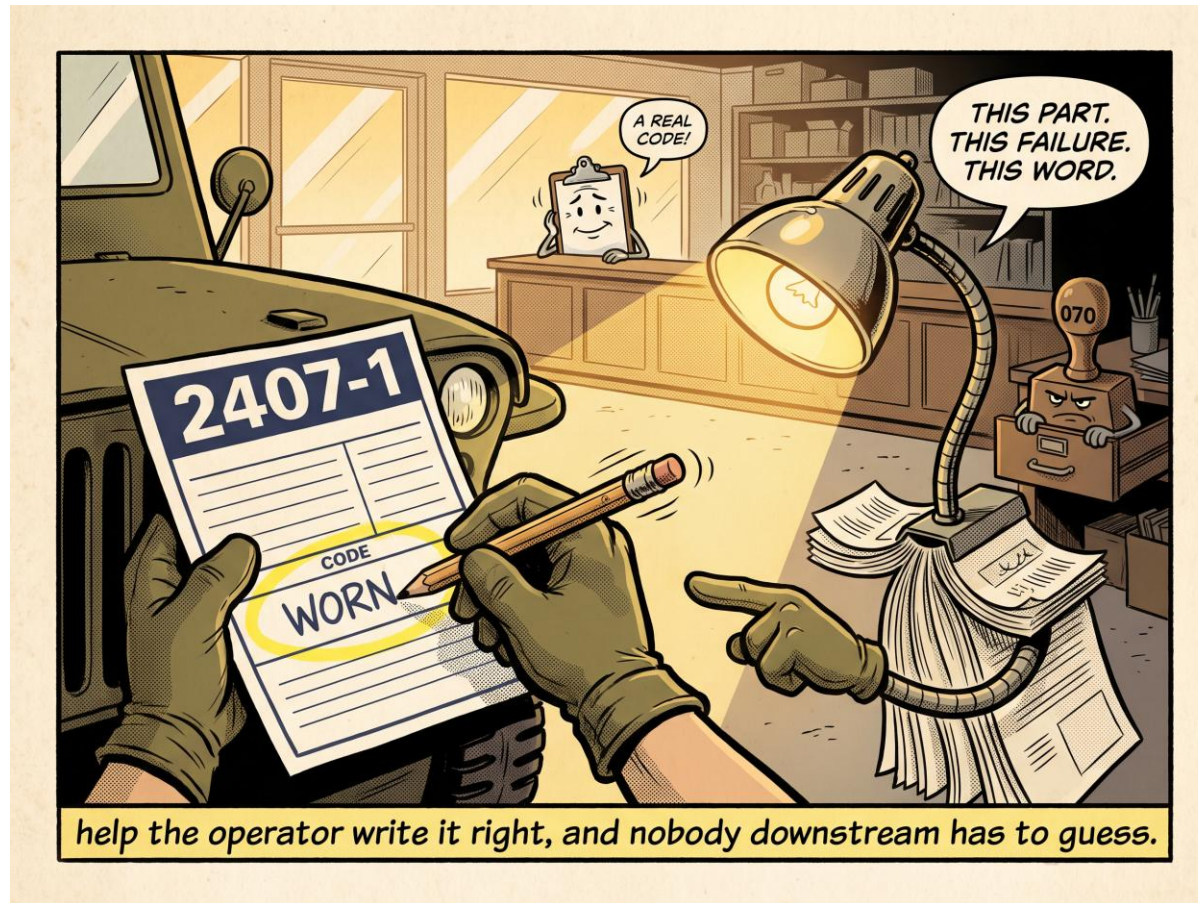
As the Soldier, I want the right manual to find me, so I don't have to guess which of twenty shouts is the one I need.
RIGHT: a librarian who already knows which one, not a hallway of books competing for attention.

User stories



As the Soldier, I want a librarian who retrieves and cross-references for me, so the answer arrives already verified.
RIGHT: access plus retrieval. Not access alone.

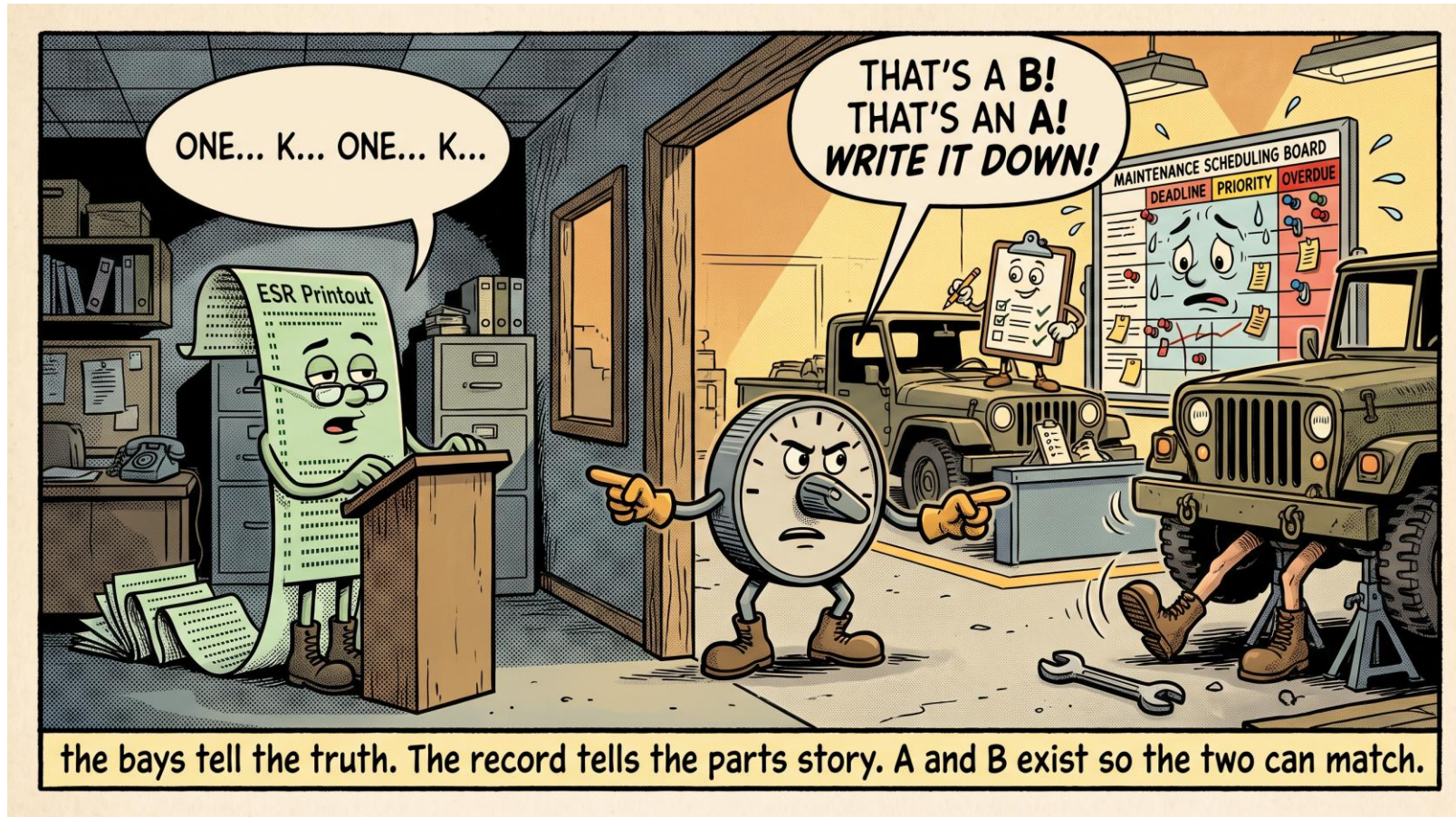
User stories



As the operator, I want to see the real code before I write it down, so the clerk downstream never has to guess.

RIGHT: worn, written and circled. 070 stays in the drawer.

User stories



As a supervisor, I want the ESR's status codes to match what's actually in the bay, so A (awaiting initial inspection) and B (in shop) mean something when I read the report.

RIGHT: the clock and the board agree with the truck on the lift.

Conclusions

- Field-level maintenance is more complex than the processes defined to manage it, and doctrine never built the layer where the Soldier does the work.
- A modern field maintenance system needs to be defined from the lowest level, time-sensitive, and decomposed into capabilities. It needs to be interpretable, user-friendly, and accessible. And it needs to be traceable, verifiable, correct, and auditable.
- This work named the system, bounded it, and found where AI belongs: at the point of entry, under human authority. A working prototype already exists.
- Meeting these needs gives the organization a record it can trust, and sets up the next step: testing this with the practitioners who live in it.

Thank you



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Army Strong PM Consultants

Field-Level Maintenance Architecture

SERC AI4SE / SE4AI Workshop | 22 September 2026 | Washington, DC

Slides and references available after the workshop.



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About Me

U.S. Army retired Chief Warrant Officer (CW4) with over 25 years of experience. I built FLMA to be the librarian doctrine needs: Soldiers consuming the standard at the moment of need, in their own context, not on a scavenger hunt.

Education

- **Bachelor of Science**, Psychology, Troy University
- **Master of Management**, Project Management, Troy University
- **Master of Science**, Industrial & Organizational Psychology, Arizona State University.
- **Systems Engineering Graduate Certificate, Colorado State University. In progress;** doctoral path is future intent.

Career

- Founder / Senior AI and Transformation Consultant: Army Strong PM Consultants, LLC (ASPMCS)
- HR Project Manager, Client-Side (SAP SuccessFactors): RWE Americas, Project Beacon
- ServiceNow SPM Technical Consultant: Optomi (Client: Centene Corporation)
- Business Analyst and IT Project Manager III: BAE Systems
- U.S. Army Ordnance Corps, Force Sustainment
- Certifications: PfMP, PgMP, PMP (11 active PMI credentials); Certified Business Architect (CBA); full ServiceNow Implementation Specialist suite

BACKUP: Eight agents, bounded governance under human authority

