MODULE 2

# Participant Workbook

## Understanding AI-Enabled Products

AI for Emergency Management Education Program
AIDE Initiative · Markle Foundation · Aspen Digital · RAND
Training content developed by RAND with support from the Markle Foundation.

THIS WORKBOOK BELONGS TO

**Name** _____

**Organization** _____

**Date** _____

## HOW TO USE THIS WORKBOOK

This module is about understanding AI-enabled products and the techniques that power them. This is your packet you can use during four in-session activities and a take-home capstone. When the workbook icon appears on screen, find the matching activity title in this booklet. Terms are defined in the Comprehensive Glossary that accompanies this series.

### LEARNING OBJECTIVES

1. Identify an AI product and the AI techniques powering it.
2. Map where AI products cluster across EM phases and use cases — and what is left to you.
3. Assess how a product's underlying tech shapes whether it fits your office.
4. Recognize how risk signals connect to what drives a product underneath.

**IN SESSION**

- Activity 1 — Spot the AI: name what the AI is doing inside a product
- Activity 2 — Stack the Task: see how several products combine, and what's missing
- Activity 3 — Read the Profile: choose the product that fits your office
- Activity 4 — Flag the Risk: spot privacy, legal, and cyber signals

**ON YOUR OWN**

- Take It With You — four takeaways, plus the Read the Pitch capstone to run on a real vendor
- Appendices — Use Case Landscape: what products enable in response, recovery, and preparedness, and where the gaps are

**Golden rule for the whole packet** — "AI-powered" is a marketing label, not a specification. Every product answers to the same four questions: what is the AI doing, what technique is behind it, what does it demand from you, and what must a person still verify or approve.

**THE MODULE IN FOUR WORDS**

**Spot it** — name what the AI is actually doing inside a product. **Stack it** — see where one product sits in a chain of see, predict, generate, act. **Profile it** — read deployment, integration, data, connectivity, and support as a fit question. **Flag it** — surface the privacy, legal, and cyber signals before procurement, not after.

SECTION 1

# Identifying AI products and techniques

Most AI is embedded inside software you reach through a browser or an app — it does its work in the background, and you never interact with the AI layer directly. LLMs are the exception. This activity is about getting past the label and naming the work the AI is doing.

Think of the eight AI techniques as colors on a palette. Each enables a different capability, and products typically blend them.

## AI techniques at a glance

| AI TECHNIQUE | WHAT IT DOES |
|---|---|
| **Machine learning and predictive modeling** | Enables systems to learn patterns from data and improve over time, including through deep learning and reinforcement learning. Applications include forecasting outcomes and estimating unknown values via supervised learning (e.g., regression) or probabilistic approaches. |
| **Natural language processing (NLP)** | Algorithms for understanding, generating, and interacting through human language in text or speech. LLMs are the dominant method for tasks such as summarization and translation but are often energy-intensive and compute-heavy. |
| **Computer vision (CV)** | Techniques that allow machines to perceive, interpret, and act on visual information from images or video. |
| **Generative AI** | Systems built on generative models (e.g., GPTs, diffusion models) that learn patterns in data — language, images, sound — and produce novel outputs. Can be trained to follow instructions and connected to external products for agentic task completion. LLMs are generative models applied to NLP. |
| **Multimodal AI** | Systems that process, fuse, and reason across multiple data types (e.g., text, images, video, audio, sensor, geospatial). Perform cross-modal analysis and generate insights that synthesize information from diverse sources. |
| **Knowledge representation and reasoning** | Frameworks for encoding, organizing, and manipulating knowledge so that machines can draw logical inferences and make decisions. Includes rule-based or knowledge-driven systems that emulate human expert decisionmaking in specialized domains. |
| **Planning, scheduling, and optimization** | Methods for selecting and sequencing actions to achieve defined goals efficiently under given constraints. |

| | |
|---|---|
| **Robotics and embodied AI** | Integration of AI into physical systems capable of perception, control, and autonomous action in dynamic environments. Embodied AI focuses on cognition through physical interaction; robotics engineers design and build the physical systems guided by those principles. |

NOTE: GPT = generative pretrained transformer; LLM = large language model; NLP = natural language processing.

> **Every technique has limits.** A computer vision product interprets images — it cannot summarize your situation report. A generative AI tool can draft text — it cannot optimize an evacuation route well.

ACTIVITY 1

IN-SESSION ACTIVITY · WRITE IN THIS SPACE

## Spot the AI

Read each product description. For each one, answer the same three questions. The goal is to move past the label and name the work the AI is doing.

**PRODUCT A**

A tool that scans incoming social-media posts and flags likely reports of flooding in your county.

What is the AI doing?

What technique is likely involved?

What does the human still need to do?

**PRODUCT B**

A dashboard that turns a folder of field photos into a building-by-building damage estimate.

What is the AI doing?

What technique is likely involved?

What does the human still need to do?

**PRODUCT C**

A service that drafts a first-pass situation report from your last shift's logs.

What is the AI doing?

What technique is likely involved?

What does the human still need to do?

**Debrief notes**

**Terms used here** (see Comprehensive Glossary): Natural language processing · Computer vision · Machine learning · Generative AI · Human in the loop

**Takeaways.** Most products have more than one AI technique enabling them. AI is doing a lot of behind-the-scenes work — you are likely using it without knowing it. And the current EM product landscape keeps humans in or on the loop: people still set priorities and make decisions, by design. The question "what does the human still need to do?" is usually the hardest to answer from a description alone — that's something you learn from the vendor.

SECTION 2

# Where AI products cluster

The market favors response; preparedness is underserved. About 53% of products support response, 36% recovery, and only about 12% preparedness. Most products are partial solutions — stacking several together is the norm.

Even within response, coverage clusters. More than 75% of response products fall into just two use cases: Situational Awareness and Hazard Monitoring, and Incident Coordination and Decision Support. Fatality management, mass care, and search and rescue are comparatively thin — far fewer products, covering narrow slices of the work. If you search for a product in a thin area and don't find much, it likely hasn't been built yet, or isn't purpose-built for your context.

| PRODUCT TYPE | WHAT IT MEANS |
|---|---|
| **Purpose-built for EM** | Explicitly designed for one or more emergency management use cases. |
| **Evidence of EM use** | Originally built for another sector, with documented use in EM. |
| **May be useful to EM** | AI platforms that can be configured for EM work but weren't built for it. |

**About half** of products are purpose-built or EM-adapted; about 40% are general-purpose. Not being built for EM doesn't disqualify a product, but it changes how much setup work you'll need. Purpose-built is the specialized trauma kit; general-purpose is the well-stocked first-aid cabinet. The use cases appendices at the back show what products enable, area by area.

ACTIVITY 2

IN-SESSION ACTIVITY · WRITE IN THIS SPACE

## Stack the Task

**Scenario.** It's 6am, a flood warning just triggered in your county, and you have these three tools.

Real operations are rarely served by one product. Here is a stack of three AI-enabled products that together support situational awareness. For each one, note what part of the workflow it covers. Then answer the three questions below.

**PRODUCT A**

A tool that scans social media, 911 calls, and news feeds, and flags posts likely describing an emerging hazard in your jurisdiction.

**PRODUCT B**

A satellite and drone imagery service that detects and classifies structural damage after an event has passed through an area.

**PRODUCT C**

A service that drafts a plain-language summary of the last several hours of incoming reports for your shift-change briefing.

**What does each tool provide?**

**What does the human need to do?**

**What is still missing?**

> **A stack is a workflow, not a shopping list.** The gaps between products — handoffs, formats, and who is watching — are where operations actually break.

SECTION 3

# How a product's tech shapes fit

Whether a product works in your office depends less on what it can do than on what it demands. Six structural features — deployment, access, integration, data input, connectivity, and support — tell you whether a product can actually work in your organization.

### DEPLOYMENT AND ACCESS · HOW IT RUNS AND HOW YOU PAY

| DEPLOYMENT MODEL | WHAT IT MEANS |
|---|---|
| **Software** | Installed on your own computer; you own the copy, maintain it, and it runs locally. |
| **SaaS** | Browser-based and vendor-hosted — the most common model in EM. Can carry almost any technique, since the vendor's servers do the heavy lifting. |
| **API** | Your IT team connects it with code. A delivery choice more than a technique signal. |
| **Hardware or edge** | Runs on a sensor or chip on a device, like a drone. The one model tied tightly to technique — commonly computer vision or sensor anomaly detection. |
| **On-premises** | Runs on local servers you physically control. A control and location choice, not a technique signal. |

| ACCESS MODEL | WHAT IT MEANS |
|---|---|
| **Enterprise license** | Organization-wide contract, often multi-year. Tends to appear with predictable-cost techniques. |
| **Per-user** | Charged per seat — unused seats still cost money. |
| **Purchase outright** | One-time cost, after which you own it. |
| **Pay-per-use** | Charged per message, image, or query. Clusters around generative AI and LLMs; prices can spike during a disaster week when query volume surges. |
| **Open source** | No license fee, but someone still has to set it up, secure it, and maintain it — and free to access is not free of licensing terms. |

**Check the claims:** ask what file format a vendor actually wants from you. Imagery suggests computer vision. A spreadsheet or database connection suggests prediction or knowledge representation. A text box suggests language.

## Product burden — integration demand and data input needs

| DIMENSION | CATEGORY | DESCRIPTION | SHARE |
|---|---|---|---|
| **Integration demand** | **Technical integration** | Requires technical expertise (e.g., APIs, custom development, new software) to connect the product to existing systems. Work typically falls on the customer's IT team or an outside integrator. | **62%** |
| **Integration demand** | **Light integration** | Configuration, data entry, or guided setup that a nontechnical administrator can typically handle without writing code or calling IT support. | **21%** |
| **Integration demand** | **Turnkey** | Usable immediately; no integration work required by the customer. | **15%** |
| **Data input needs** | **Ongoing user input** | Staff must continuously enter records, update contact lists, stream sensor or camera data, or provide ongoing platform access to databases. | **44%** |
| **Data input needs** | **User input at use** | The product needs specific files, documents, prompts, or location data each time the user engages with it. | **48%** |
| **Data input needs** | **100% vendor maintained** | The product arrives with the data it needs already in place; does not rely on the customer to keep it supplied. | **7%** |

NOTE: Percentages may not sum to 100 because of rounding. One to two percent of products were unknown on each dimension.

## Connectivity risk

| CONNECTIVITY REQUIREMENT | DESCRIPTION | SHARE |
|---|---|---|
| **Online only — high risk** | Requires continuous internet connection to function. Product stops working if connection drops. | **78%** |
| **Intermittent tolerant — moderate risk** | Can continue to function during brief disruptions and reconnect when service returns. | **11%** |
| **Offline capable — low risk** | Can function fully without internet connectivity. | **10%** |

NOTE: A product may be unreachable not because of your network, but because the vendor's servers are down or overloaded. This second dependency is rarely visible at the procurement stage.

## Technical assistance and learning support

| SUPPORT TYPE | DESCRIPTION | SHARE OFFERING |
|---|---|---|
| **24/7 technical assistance** | Vendor offers round-the-clock support coverage. | **32%** |
| **Learning support courses** | Vendor provides online courses, academies, tutorials, or structured training modules for users. | **52%** |
| **Other learning support materials** | Vendor offers other online resources such as help centers, documentation, knowledge base articles, developer documents, webinars, or community forums. | **87%** |

Disasters do not follow business hours. For any product meant to function during an active response, the absence of 24/7 support is the finding that matters most.

ACTIVITY 3

IN-SESSION ACTIVITY · WRITE IN THIS SPACE

## Read the Profile

**Scenario.** You are a small county EM office with one IT staff member and unreliable rural internet. Which product is the better fit? The answer is not in the capability — it is in the profile.

| FEATURE | PRODUCT A | PRODUCT B |
|---|---|---|
| **Deployment** | SaaS | Software, installed locally |
| **Access** | Pay-per-use, per image processed | Enterprise license, flat annual |
| **Connectivity** | Requires online | Intermittent tolerant |
| **Integration** | Requires technical integration | Light — configuration only |
| **Data input** | Vendor maintained | Ongoing user input |
| **Support** | Structured training; 24/7 support | Self-serve docs; business hours |

### My choice

☐ **Product A**

☐ **Product B**

**Why**

**What tradeoff did I accept with this choice?**

> **There is no free choice here.** Every profile buys you something and costs you something. Naming the tradeoff out loud is what makes it a decision rather than a default.

SECTION 4

# Risk signals and AI governance

Privacy risk is near-universal; legal and cyber concerns affect a meaningful minority; AI-governance assurance is currently rare. The goal is to surface these signals before procurement, not after.

**AI governance** is the set of policies and practices that ensure AI is built, deployed, and used in line with organizational priorities and that its risks are managed. Cybersecurity has a mature assurance ecosystem — SOC 2, ISO 27001, FedRAMP — where a third party verifies specific controls. About 60% of vendors in this landscape publicly list that kind of evidence. But none of those certifications address AI-specific risks, and the AI-specific equivalents (ISO/IEC 42001, the voluntary NIST AI Risk Management Framework) are rare: less than one percent of products carry a vendor claim to either. For now, how responsibly an AI is governed depends mostly on what the vendor chooses to tell you.

**THREE GOVERNANCE SIGNALS TO ASK ABOUT**

☐ Does the vendor describe how the model is validated?
☐ Do they document known limitations?
☐ Do they have a responsible AI policy?

Silence on all three doesn't disqualify a product — almost nothing passes today — but it tells you where to apply extra scrutiny.

## Most observed patterns in privacy concerns

| # | PATTERN | DESCRIPTION |
|---|---|---|
| 1 | **Geospatial and location-linked data** | Real-time GPS tracking of individuals, vehicles, or assets; property- and address-level risk scores and aerial imagery; population-level mobility analytics; critical infrastructure asset geolocation. |
| 2 | **Visual surveillance, imagery, and biometric data** | Drone footage, security camera feeds, body-worn camera recordings, and satellite imagery capturing people or private property; biometric identifiers including facial recognition templates, voice prints, DNA and genomic profiles, and fingerprints. |
| 3 | **Public safety, health, and emergency communications data** | Protected health information and patient records; EMS care reports and behavioral health data; recorded or transcribed emergency services calls; dispatch and CAD incident data; criminal justice information services–regulated records; crisis hotline content. |

| | | |
|---|---|---|
| 4 | **Financial, insurance, and workforce monitoring data** | Loan applications and credit records; policyholder claims and underwriting inputs; donor and payment card data; continuous driver behavior tracking, in-cab video, wearable physiological sensors, and GPS-verified timesheets tied to named individuals. |
| 5 | **Digital intelligence and third-party AI data flows** | Aggregation of social media content and geolocation-tagged posts for OSINT; dark web credential and breach monitoring; user prompts, organizational documents, or PII routed to external LLM providers as part of generative AI features. |

NOTE: General PII collected through routine platform operations (e.g., account registration, contact details, IP addresses) is present in virtually every flagged product and is omitted from this table. Most products trigger three, four, or five privacy categories simultaneously — not just one. Avoiding privacy considerations is not a realistic option in this product landscape. CAD = computer-aided dispatch; EMS = emergency medical services; LLM = large language model; OSINT = open-source intelligence; PII = personally identifiable information.

## Most observed patterns in legal concerns

| # | PATTERN | DESCRIPTION |
|---|---|---|
| 1 | **Patent infringement litigation** | The technology company or product is named in U.S. patent infringement lawsuits, either as plaintiff or defendant. |
| 2 | **Data privacy and data malpractice class actions** | Lawsuits allege the unauthorized collection, unauthorized sharing, or mishandling of personal data. This category also includes lawsuits against major AI platform companies over training data practices. |
| 3 | **Regulatory enforcement actions** | Government agencies (FTC, FCC, SEC, state attorneys general) are taking formal action against the technology company. |
| 4 | **Securities fraud class actions** | Shareholder lawsuits allege that the technology company made false or misleading statements about business performance. |
| 5 | **Contract, commercial, or employment disputes** | Business-to-business disputes, employment lawsuits, or commercial litigation that do not fit other categories. |

NOTE: Patent litigation is common by volume, but privacy and AI-related copyright cases more often impose direct operational risks — including regulatory fines, restrictions on data use, and requirements for product modification. A documented legal concern means something specific has been filed or pursued. Not every action affects operational use, but the nature of the concern matters. FCC = Federal Communications Commission; FTC = Federal Trade Commission; SEC = Securities and Exchange Commission.

## Most observed patterns in cyber concerns

| # | PATTERN | DESCRIPTION |
|---|---|---|
| 1 | **Documented breaches or ransomware attacks** | The technology company or product has experienced a confirmed, publicly reported security incident, whether or not the company has earned cybersecurity certifications since the incident (e.g., SOC 2, ISO 27001). |
| 2 | **Published critical vulnerabilities** | Products with formally documented, high-severity security vulnerabilities, especially those in the Cybersecurity and Infrastructure Security Agency's Known Exploited Vulnerabilities Catalog. |
| 3 | **Inherent vulnerabilities in IoT and hardware devices** | Connected devices (e.g., drones, cameras, sensors, wearables) with category-wide known vulnerabilities. |
| 4 | **Inherent vulnerabilities in AI and ML systems** | Vulnerabilities unique to AI and ML systems that introduce novel attack surfaces (e.g., prompt injection, model manipulation, guardrail bypass). These are not addressed by traditional cybersecurity controls. |
| 5 | **Sensitive data handling with documented misuse** | Products for which the nature of the data collected, combined with documented misuse or questionable practices, constitutes a cyber concern. |

NOTE: Certification alone is not a reliable signal of current cyber posture — companies with recognized certifications still appeared in the cyber concerns data because of confirmed breaches or unpatched critical vulnerabilities. ISO = International Organization for Standardization; IoT = Internet of Things; ML = machine learning; SOC = System and Organization Controls.

ACTIVITY 4

IN-SESSION ACTIVITY · WRITE IN THIS SPACE

# Flag the Risk

Read the drone-based damage-assessment product description below. Use the risk-signal checklist to identify what the description tells you — and what it does not tell you — about the product. Take two minutes, then compare notes with a neighbor.

**THE PRODUCT**

A drone platform uses computer vision to classify building damage, routes findings to an EOC dashboard, and stores all imagery in the cloud. The vendor's website states the platform is “AI-powered” and “trusted by public safety agencies nationwide.”

**What do we know about how this was tested?**

**What do we know about this product's limitations?**

**What are the potential failure points of the product?**

**Who is responsible if something goes wrong?**

**Cross-reference:** the privacy, legal, and cyber pattern tables earlier in this section name the signals that show up most often across the product landscape. Use them as your checklist here.

**The point is not finding everything.** One sentence of product description can trigger three or four risk categories. The point is that you practiced asking the question — that's the habit.

TAKE IT WITH YOU

# Four Takeaways, and Your Capstone

One takeaway per objective. Reuse the capstone questions long after today — take them into your next vendor meeting.

1 An AI-enabled product is a named, purchasable tool — and most have more than one AI technique enabling them.

2 Currently, most EM products support response; few preparedness products exist. Stacking is the norm, and it carries real costs.

3 Six structural features determine if a product can actually work in your organization.

4 Different AI techniques create different governance risks and failure points.

TAKE IT WITH YOU · CAPSTONE

# Read the Pitch

A one-page vendor pitch — fictional but realistic. Most pitches tell you what a product does; they are less good at telling you what it requires, what risks are present, and what the total cost looks like. Which questions can you answer from the pitch alone? Usually one or two. The rest typically require consulting with the vendor directly.

THE VENDOR PITCH

### StormSight AI™ — Next-Generation Situational Awareness for Emergency Management

StormSight AI is a cloud-based AI platform that provides real-time situational awareness for emergency managers. Our proprietary machine learning models ingest data from weather services, social media feeds, traffic cameras, and satellite imagery to deliver a unified operational picture directly to your EOC.

KEY FEATURES

- AI-powered event detection automatically identifies emerging incidents from social media and sensor data
- Predictive modeling forecasts storm impacts and resource needs up to 72 hours in advance
- Natural language processing summarizes incoming reports into actionable briefings
- Interactive dashboard with GIS integration for real-time visualization
- Automated alert generation with multilingual support

**WHY STORMSIGHT AI?**

- Trusted by over 40 public safety agencies nationwide
- Winner of the 2025 GovTech Innovation Award
- Easy to deploy — most agencies are operational within days
- Seamless integration with leading EM platforms

*"StormSight AI transforms the way you see your community during a crisis."*

**1 · What type of product is this, and what AI technique(s) are involved?**

Use the technique table in Section 1 to name them precisely.

**2 · What do the structural features suggest — and what is missing?**

Deployment, integration, data input, connectivity, support.

**3 · What governance signals does this pitch provide — and what is missing?**

Testing, accuracy claims, data handling, accountability, oversight.

**4 · What would you want verified before trusting it?**

Name the question you would ask the vendor first.

A pitch is evidence of what the vendor wants to say, not of what the product does. The absence of a claim — about testing, accuracy, data retention, or who is accountable — is itself a finding.

APPENDIX A

# Response use cases and AI-related patterns

Table A.1 · What current AI products actually enable, use case by use case. Product counts describe the reviewed landscape.

| USE CASE | WHAT THE USE CASE COVERS | DOMINANT AI TECHNIQUES | WHAT CURRENT PRODUCTS ENABLE |
|---|---|---|---|
| **Situational Awareness, Hazard Monitoring, and Information Sharing** 516 products | Tasks in this area are to continuously collect, verify, and synthesize incident status, impacts, and resource posture and maintain and share a common picture. | Nearly universal ML and predictive modeling; CV is the second-most common (satellite, drone, camera networks); NLP is prominent in OSINT and event detection; Multimodal AI appears in sensor fusion and multisource analysis platforms | AI is collecting and analyzing data at scale. It tracks changes and looks for patterns across datasets. |
| **Public Information, Alerts, and Protective Guidance** 131 products | Tasks in this area are to craft, issue, and disseminate time-critical alerts and ongoing public updates with clear protective actions. | ML and predictive modeling (threat detection that triggers alerts); NLP (message generation, translation); Generative AI (drafting and optimization) | The dominant AI contribution is speed and reach amplification—AI does not decide what to say but makes message creation faster (e.g., generative AI drafting), broader (translation), and more targeted (geo-fencing and automated triggers). |
| **Protective Action Decision and Implementation** 37 products | Tasks in this area are to decide and carry out life-safety measures (e.g., evacuate, shelter-in-place), including zones, timing, and special-population support. | ML and predictive modeling (fire spread, flood, traffic modeling); CV (wildfire detection triggering decisions); Planning, scheduling, and optimization (evacuation sequencing) | The AI helps decisionmakers model consequences and the timing of protective actions, not just execute them. |

| USE CASE | WHAT THE USE CASE COVERS | DOMINANT AI TECHNIQUES | WHAT CURRENT PRODUCTS ENABLE |
|---|---|---|---|
| **Evacuation and Transportation Operations** **59 products** | Tasks in this area are to plan, route, and move people to safety and coordinate transportation assistance and priority movement. | ML and predictive modeling (traffic prediction, clearance estimation); Planning, scheduling, and optimization (routing, signal control); CV (vehicle and pedestrian detection at intersections) | AI's role is predominantly predictive modeling and optimization—predicting how evacuations will unfold, optimizing signal timing, and providing real-time feedback on corridor performance. |
| **On-Scene Security, Access, and Perimeter Control** **48 products** | Tasks in this area are to manage access restrictions, site security, road closures, and reentry to protect responders and the public. | CV (dominant—license plate recognition, facial recognition, weapon detection, video analytics); ML and predictive modeling (alert scoring, behavior analysis) | AI's role is automated detection and alerting at access control points. |
| **Search and Rescue** **55 products** | Tasks in this area are to locate, access, stabilize, and remove people from dangerous environments to safe locations. | CV (person and object detection); Robotics and embodied AI (autonomous navigation, obstacle avoidance); ML (target tracking, thermal signature classification); Planning, scheduling, and optimization (mission planning) | AI enables faster, safer search by putting sensors where humans cannot go (or cannot go quickly). The dominant pattern is CV-based detection on autonomous or semiautonomous aerial platforms. |
| **Public Health, Health Care, and EMS** **67 products** | Tasks in this area are to field triage and treatment, patient movement, health care coordination and surge, and immediate public-health actions. | ML and predictive modeling (clinical prediction, surge forecasting); CV (medical imaging, X-ray AI); NLP (voice-to-text documentation, translation); Generative AI (ambient clinical documentation, such as Epic AI Charting) | AI in this use case follows two tracks: (1) clinical decision support (e.g., stroke imaging, sepsis detection, patient flow) that targets hospitals and healthcare systems; (2) field operations support (e.g., EMS documentation, patient tracking, dispatch protocols, responder monitoring) that targets pre-hospital providers. |

| USE CASE | WHAT THE USE CASE COVERS | DOMINANT AI TECHNIQUES | WHAT CURRENT PRODUCTS ENABLE |
|---|---|---|---|
| **Fatality Management Services** **10 products** | Tasks in this area are to recover, identify, track, and care for the deceased with dignity and support family notifications. | ML and predictive modeling (biometric matching, DNA analysis algorithms); Knowledge representation (genealogical reasoning) | AI in fatality management is concentrated in biometric matching at scale—processing degraded DNA, degraded fingerprints, and facial images against large databases. |
| **Fire Management and Suppression** **45 products** | Tasks in this area are to control and suppress fires to protect life, property, and the environment. | CV (smoke and fire detection, satellite analysis); ML and predictive modeling (fire spread simulation, risk scoring); Planning, scheduling, and optimization (suppression mission planning); Robotics (autonomous aircraft) | Fire management has the most end-to-end AI pipeline of any single-hazard use case, going from early detection to spread prediction to suppression planning to autonomous suppression to post-fire assessment. |
| **Environmental Hazard Response and Responder Health and Safety** **44 products** | Tasks in this area are to detect, contain, and mitigate acute environmental and hazardous material threats and monitor and protect responder and public health and safety. | ML and predictive modeling (physiological prediction, gas identification algorithms); Robotics (hazardous area entry); CV (environmental sensing); Knowledge representation (HazMasterG3 rules-based reasoning) | AI serves two distinct functions: (1) hazard detection—identifying what the threat is (chemical identification, gas detection, water contamination); (2) keeping humans out of harm's way—responder biometric monitoring, robotic zone entry, and safety compliance monitoring. |
| **Shelter, Mass Care, and Human Services** **25 products** | Tasks in this area are to provide emergency shelter, food, hydration, sanitation, supplies distribution, and short-term support services. | ML and predictive modeling (needs matching, demand forecasting); NLP (chatbots, intake automation); Knowledge representation (resource matching rules); Planning, scheduling, and optimization (supply distribution) | This use case has thinner AI coverage than most operational use cases. The strongest products here are chatbots providing information access and donation-matching platforms. |

| USE CASE | WHAT THE USE CASE COVERS | DOMINANT AI TECHNIQUES | WHAT CURRENT PRODUCTS ENABLE |
|---|---|---|---|
| **Family Reunification and Welfare Checks** **18 products** | Tasks in this area are to receive and resolve missing-person reports, conduct welfare checks, and support safe reunification. | ML (biometric matching, crash detection); CV (facial recognition); NLP (voice transcription/translation) | Products bifurcate into forensic identification (primarily for deceased and unidentified persons, overlapping with Fatality Management) and consumer safety apps (for families seeking to confirm their loved ones' safety). |
| **Volunteer, Donations, and Offers Management** **19 products** | Tasks in this area are to solicit, vet, match, and coordinate volunteers and in-kind and financial donations to documented needs. | Planning, scheduling, and optimization (volunteer scheduling); ML (donor prediction, skills matching); NLP (communication automation); Generative AI (volunteer page creation, campaign content) | The dominant AI archetype is intelligent matching—connecting supply (volunteers, goods, and donations) to demand (documented needs). |
| **Assistance Requests Intake, Triage, and Dispatch** **96 products** | Tasks in this area are to receive, verify, and prioritize requests for help and dispatch or refer appropriate resources. | NLP (transcription, translation, conversational AI); ML (call triage, priority scoring, routing); Generative AI (call summarization, non-emergency agent) | The dominant innovation is AI as copilot for telecommunicators—not replacing humans but augmenting them with transcription, translation, and summarization so that they can process more calls with less cognitive load. |
| **Resource Request, Allocation, and Logistics** **118 products** | Tasks in this area are to request, prioritize, stage, track, and deliver personnel, equipment, and commodities to meet operational needs. | ML and predictive modeling (ETAs, demand forecasting, equipment health); Planning, scheduling, and optimization (routing, crew assignment, warehouse operations); CV (dashboard camera safety, condition monitoring); Robotics (autonomous delivery) | AI is strongest in visibility (knowing where things are) and optimization (deciding where to send them). Most products in this space are commercial fleet and supply chain products adapted for emergency use rather than purpose-built for disaster logistics. Drone delivery represents an emerging autonomous logistics capability. |

| USE CASE | WHAT THE USE CASE COVERS | DOMINANT AI TECHNIQUES | WHAT CURRENT PRODUCTS ENABLE |
|---|---|---|---|
| **Emergency Debris Clearance and Route Opening** **9 products** | Tasks in this area are to remove immediate life-safety hazards and open priority routes to enable rescue and aid delivery. | CV (damage detection); ML (route assessment); Robotics (autonomous equipment operation) | This is a physically intensive use case in which AI's role is emerging but limited. The autonomous heavy equipment cluster represents the highest-autonomy AI application in debris operations. AI's strongest contribution is in identifying where debris is (satellite and road imagery) rather than broadly tracking, managing, and removing it. |
| **Critical Infrastructure and Essential Services Stabilization (Immediate)** **76 products** | Tasks in this area are to take immediate actions that stabilize essential services (e.g., temporary power and fuel, water and wastewater workaround) to protect life and property and support operations. | ML and predictive modeling (dominant—outage prediction, asset health, demand forecasting); Planning, scheduling, and optimization (distributed energy resource dispatch, grid balancing); CV (sewer and pipeline inspection); Knowledge representation (rule-based grid control) | AI's highest-value application is in predictive outage modeling—converting weather forecasts into expected outage counts, locations, and crew requirements days in advance. The microgrid and virtual power plant cluster represents AI-enabled islanded resilience—keeping critical facilities powered when the main grid fails. Water and sewer products focus on rapid damage assessment and workaround identification. |
| **Communications and IT Continuity for Response Operations** **68 products** | Tasks in this area are to maintain and restore mission-critical communications and basic IT needed to coordinate and sustain response. | ML and predictive modeling (anomaly detection, threat detection, network optimization); NLP (transcription, translation, noise cancellation); Generative AI (incident summarization, root-cause analysis) | AI in this use case serves a meta-function—it keeps the technological infrastructure that all other use cases depend on operational. AI operations products reduce alert fatigue (correlating thousands of alerts into actionable incidents), cybersecurity AI prevents disruption, and unified communications-as-a-service AI improves communication quality in noisy field environments. |

| USE CASE | WHAT THE USE CASE COVERS | DOMINANT AI TECHNIQUES | WHAT CURRENT PRODUCTS ENABLE |
|---|---|---|---|
| **Incident Coordination and Operational Decision Support** **340 products** | Tasks in this area are to coordinate multi-organization actions, set objectives, manage operational periods, and document decisions and priorities. | ML and predictive modeling (nearly universal); NLP (summarization, conversational queries); Generative AI (briefing generation, decision support); Knowledge representation (ICS workflows, protocol logic); Planning, scheduling, and optimization | AI plays two distinct roles: (1) acceleration—getting information to decisionmakers faster through summarization, fusion, and autonomous scouting; (2) prediction—modeling scenarios to inform resource positioning and operational planning. Products span from platforms that structure the entire incident management life cycle to point solutions providing specific decision inputs. The emerging trend is generative AI assistants embedded in EOC platforms that can summarize board data, generate situation reports, and answer queries in natural language—representing AI moving from providing data to providing synthesized judgment support. |
| **Initial Damage and Impact Assessment** **209 products** | Tasks in this area are to rapidly assess damages and priority needs, confirm the cessation of immediate threats, and inform next steps. | CV (dominant—the core technology for visual damage assessment); ML and predictive modeling (damage classification, risk scoring); Multimodal AI (fusing optical, SAR, and sensor data); Generative AI (report generation from field data) | The dominant pattern is automated image analysis at scale—turning satellite, aerial, or ground-level imagery into damage classifications faster than manual inspection. The pipeline typically flows from imagery capture to AI classification to GIS visualization to FEMA-aligned reporting. |

NOTE: ETA = estimated time of arrival. CV = computer vision; ML = machine learning; NLP = natural language processing; OSINT = open-source intelligence.

APPENDIX B

# Recovery use cases and AI-related patterns

Table B.1

| USE CASE | WHAT THE USE CASE COVERS | DOMINANT AI TECHNIQUES | WHAT CURRENT PRODUCTS ENABLE |
|---|---|---|---|
| **Damage and Impact Assessment** 260 products | Tasks in this area are to identify and quantify physical, social, and economic impacts after an incident. They cover rapid building damage surveys, infrastructure status checks, community needs assessments, and mapping of affected populations and critical facilities. This use case supports the prioritization of life-safety risks and time-sensitive recovery actions. | CV (property and infrastructure inspection); ML (damage scoring, economic modeling); Multimodal AI (fusing imagery, sensor, and demographic data) | The dominant pattern is automated image analysis at scale—turning satellite, aerial, or ground-level imagery into damage classifications faster than manual inspection. The recovery version emphasizes comprehensiveness and accuracy over speed. Products shift from satellite-scale to property-level inspection and from binary damaged-or-not assessments to detailed condition reports with repair estimates. |
| **Infrastructure and Lifelines Restoration** 71 products | Tasks in this area are to restore critical lifelines, such as power, water, wastewater, transportation, and communications, so that communities can function safely. They cover prioritizing repairs, sequencing restoration, coordinating field crews, issuing boil-water or outage advisories, and tracking system status. | ML and predictive modeling (dominant—outage prediction, asset health, demand forecasting); Planning, scheduling, and optimization (crew dispatch, restoration sequencing); CV (condition assessment); Knowledge representation (asset life-cycle rules, fault diagnosis) | The strongest AI application is in electric utility restoration—a mature market with dedicated products for outage prediction, crew optimization, and customer communication. Water and wastewater and telecommunications restoration have fewer purpose-built AI products. The core AI value proposition is reducing restoration time by optimizing the task sequence: identify damage, prioritize repairs, dispatch crews, and track progress. |

| USE CASE | WHAT THE USE CASE COVERS | DOMINANT AI TECHNIQUES | WHAT CURRENT PRODUCTS ENABLE |
|---|---|---|---|
| **Housing and Shelter Recovery**<br>**30 products** | Tasks in this area are to transition survivors from emergency shelter to safe and accessible interim and long-term housing. They cover assessing housing needs, matching survivors to available units, siting temporary housing, tracking habitability and reentry status, and coordinating renovations or rebuilds. | ML (housing matching, risk scoring); CV (property inspection, building plan review); NLP (case management, chatbots); Generative AI (code compliance checking) | AI's strongest application is in accelerating the rebuild pipeline—from code compliance checking (e.g., reducing permit review from weeks to days) to construction management (e.g., optimizing rebuild schedules). |
| **Health, Education, Behavioral Health, and Social Services Recovery**<br>**39 products** | Tasks in this area are to restore and strengthen the systems that keep people physically healthy, mentally well, socially supported, and connected to education, especially for those who are directly or indirectly affected by disaster. Tasks cover assessing damage and the functionality of hospitals, clinics, pharmacies, behavioral health facilities, schools, child care centers, and social services offices; reestablishing essential medical care; expanding and coordinating behavioral health and psychosocial support, including crisis counseling, trauma-informed care, and support groups; restoring kindergarten through grade 12 schools, higher education, and child care services; ensuring the continuity of critical social services (e.g., food assistance, disability services, child welfare, services for older adults and people with access and functional needs); and identifying and prioritizing high-risk and disproportionately affected populations. | NLP (crisis text analysis, behavioral monitoring, documentation); ML (risk scoring, triage, activity pattern detection); Generative AI (conversational wellness companions); CV (student content monitoring, video assessment) | The strongest AI contributions are in: (1) behavioral health screening at scale—identifying who needs help before they ask for it (student monitoring, crisis text triage, video-based assessments); (2) social determinants of health analytics—mapping where social vulnerability intersects with disaster impact to target recovery resources. |

| USE CASE | WHAT THE USE CASE COVERS | DOMINANT AI TECHNIQUES | WHAT CURRENT PRODUCTS ENABLE |
|---|---|---|---|
| **Individual and Household Assistance and Case Management** **64 products** | Tasks in this area are to help individuals and households navigate assistance options and recover basic stability. They cover intake and triage, eligibility screening, referral to programs (housing, food, financial help), follow-up, and coordination among multiple providers around a single survivor or family. | NLP (conversational intake, document processing, multilingual support); ML (eligibility prediction, risk scoring, case prioritization); Generative AI (response drafting, form generation); Knowledge representation (program rules, eligibility logic) | The dominant AI archetype is navigation and matching. Benefits navigation is the fastest-growing segment. |
| **Economic and Workforce Recovery** **41 products** | Tasks in this area are to stabilize and revitalize local economies and employment. They cover business impact assessments, small business support, coordination of reopening plans, workforce retraining and placement, and the prioritization of investments that protect jobs and community anchors. | ML and predictive modeling (skills matching, labor forecasting, lending risk); NLP (resume and skill extraction, learning content); Generative AI (career coaching, learning assistance); Knowledge representation (skill taxonomies, program eligibility) | AI's primary role is accelerating the matching of people to economic opportunities—whether they are jobs, training, or capital. Skills-based matching is a dominant theme, directly relevant when disaster-displaced workers need rapid reemployment in unfamiliar sectors. |
| **Debris, Waste, and Environmental Safety Management** **22 products** | Tasks in this area are to remove debris and hazardous materials to restore safe access and reduce secondary risks. They cover debris volume estimation, route planning and staging, prioritization of clearance for critical facilities and neighborhoods, environmental testing, and coordinating disposal and recycling. | CV (debris detection, waste sorting, environmental sensing); ML (route optimization, compliance); Knowledge representation (waste classification rules, Resource Conservation and Recovery Act compliance) | The most effective AI contribution is in automated detection (where debris is) and logistics optimization (how to route crews and trucks). The products that exist focus on waste tracking and compliance rather than the massive logistics challenge of debris estimation, staging, hauling, and monitoring. |

| USE CASE | WHAT THE USE CASE COVERS | DOMINANT AI TECHNIQUES | WHAT CURRENT PRODUCTS ENABLE |
|---|---|---|---|
| **Natural and Cultural Resources Restoration**<br>**10 products** | Tasks in this area are to assess and restore damaged natural systems (e.g., coasts, forests, rivers) and cultural or historic sites. They cover impact assessments, the prioritization of restoration projects, permitting coordination, and engagement with communities regarding culturally significant sites and practices. | CV (dominant—satellite image analysis, species identification); ML (change detection, carbon estimation, predictive ecology); Robotics (forestry automation) | AI enables continuous, large-scale environmental monitoring that would be impossible manually, such as tracking millions of acres of forest, identifying species from acoustic recordings, or mapping coastal erosion from space. The products are primarily monitoring and assessment products rather than restoration execution products. |
| **Community Engagement, Communication, and Information Access**<br>**80 products** | Tasks in this area are to ensure survivors and stakeholders receive timely, accessible, and trustworthy information and can provide input. They cover recovery public messaging, community meetings, two-way feedback, rumor control, translation and interpretation, and accessible formats for people with disabilities and limited English proficiency. | NLP (dominant—translation, transcription, chatbot conversation, sentiment analysis); Generative AI (content generation, message drafting); ML (sentiment scoring, need prediction) | The core challenge is communicating complex recovery information to diverse populations. AI addresses this through: (1) translation and interpretation across dozens of languages; (2) chatbots that provide instant answers without requiring call center staff; (3) sentiment analysis to track whether communications are working. The two-way feedback component is addressed by engagement platforms that analyze open-ended responses. |
| **Resource, Logistics, and Supply Chain Management for Recovery**<br>**41 products** | Tasks in this area are to obtain, allocate, and track resources needed for recovery operations, including materials, equipment, and personnel. They cover identifying gaps, prioritizing requests, staging supplies, coordinating with technology companies, and tracking deliveries and usage across sites. | ML (predictive ETAs, demand forecasting, risk scoring); Planning, scheduling, and optimization (routing, warehouse operations, construction scheduling); Knowledge representation (supply chain graph models); NLP (disruption event detection from news) | The strongest AI capability is in disruption detection and adaptive replanning. When a supplier fails or a route closes, AI identifies alternatives. |

| USE CASE | WHAT THE USE CASE COVERS | DOMINANT AI TECHNIQUES | WHAT CURRENT PRODUCTS ENABLE |
|---|---|---|---|
| **Volunteer, Donations, and Community Support Coordination** **18 products** | Tasks in this area are to organize spontaneous and affiliated volunteers, manage in-kind and financial donations, and align community support with real needs. They cover volunteer registration and assignment, donations intake and matching, avoiding duplication of effort, and capturing community capacity for recovery. | ML (skills matching, donor propensity); NLP (communication automation, campaign content); Generative AI (volunteer opportunity creation, fundraising content); Planning, scheduling, and optimization (assignment, scheduling) | The recovery volunteer and donation challenge differs from response: It requires sustained coordination over months rather than surge mobilization. AI helps by matching skills to specialized recovery task areas (e.g., mold remediation, case management, construction) and maintaining donor engagement over longer timelines. |
| **Recovery Governance, Planning, and Interagency Coordination** **35 products** | Tasks in this area are to structure how recovery decisions are made and coordinated across agencies and organizations. They cover setting up recovery task forces, developing and updating recovery plans, tracking progress against objectives, resolving conflicts, and aligning local, state, and federal roles. | Generative AI (briefing generation, plan drafting, meeting summarization); NLP (document analysis, natural-language querying); ML (progress tracking, scenario modeling) | AI's role in governance is primarily about information synthesis and decision acceleration—turning large volumes of recovery data into concise briefings, tracking corrective actions, and enabling leaders to ask questions in natural language rather than running reports. The generative AI wave is particularly effective here because it addresses the enormous documentation burden of recovery governance (e.g., plans, reports, meeting minutes, compliance documentation). |

| USE CASE | WHAT THE USE CASE COVERS | DOMINANT AI TECHNIQUES | WHAT CURRENT PRODUCTS ENABLE |
|---|---|---|---|
| **Financial Recovery, Grants, Cost Tracking, and Insurance**<br>**97 products** | Tasks in this area are to enable institutions, individuals, households, and businesses to secure, manage, and account for the money needed to recover in a way that meets eligibility, compliance, and audit requirements. For public agencies and NGOs, they cover identifying and prioritizing funding sources, preparing and managing grant and loan applications, cost tracking and documentation, managing compliance and reporting requirements, and aligning and braiding multiple funding streams. For individuals, households, and businesses, they cover understanding and applying for financial assistance programs; filing insurance claims, tracking status, documenting losses, and navigating appeals; and getting connected to financial counseling, legal aid, and small-business support. | ML (risk scoring, fraud detection, claim prediction); CV (damage estimation from imagery, document OCR); NLP (grant proposal drafting, document extraction); Generative AI (grant writing, claims summarization); Knowledge representation (compliance rules, eligibility logic) | The fundamental AI value proposition is accelerating money flow—faster claims processing, faster grant applications, and faster cost documentation. |
| **Land Use, Rebuilding, and Mitigation Planning Through Recovery**<br>**24 products** | Tasks in this area are to guide where and how rebuilding occurs to reduce future risk (build back better). They cover post-disaster land use decisions, buyout or relocation programs, elevation and retrofitting plans, updates to building codes, and the integration of mitigation into recovery projects. | CV (plan review, building detection); NLP (code interpretation); Generative AI (code Q&A, plan analysis); Knowledge representation (code compliance rules); ML (climate projection, risk scoring) | AI's strongest contribution is in accelerating the permitting pipeline—the bottleneck that slows rebuilding after disasters. Automated plan review can reduce review times from weeks to hours. Climate risk models inform where rebuilding should occur (and where it should not), supporting buyout and relocation decisions. The connection between rebuilding and mitigation is addressed by code compliance products that enforce updated standards. |

| USE CASE | WHAT THE USE CASE COVERS | DOMINANT AI TECHNIQUES | WHAT CURRENT PRODUCTS ENABLE |
|---|---|---|---|
| **Data, Information Management, and Situational Awareness for Recovery**<br>179 products | Tasks in this area are to collect, integrate, analyze, and share recovery-relevant data. They cover maintaining common operating pictures, integrating geospatial and sectoral data, tracking key recovery indicators, and providing decision support dashboards or reports to leaders and the public. | ML (analytics, pattern detection); Generative AI (summarization, conversational data access); NLP (document processing, search); CV (imagery analysis, video analytics) | AI's role is making recovery data accessible and actionable, converting raw data into dashboards, enabling leaders to ask questions in natural language, and automatically tracking recovery metrics. The generative AI wave has significantly affected this space through conversational analytics that let nontechnical users interact with data. |
| **Private-Sector and Public-Private Partnership Recovery Coordination**<br>13 products | Government, private sector, and nongovernmental partners work together in structured or semi-structured ways (e.g., P3s, BEOCs, sector coalitions) to coordinate recovery actions, particularly around lifelines, critical services, and economic stability. They cover establishing public-private structures for recovery; creating shared situational awareness about impacts to critical businesses, infrastructure, supply chains, and the workforce; coordinating the restoration of community lifelines; jointly identifying and addressing supply chain disruptions; aligning business reopening decisions with community recovery priorities; and facilitating information sharing, mutual aid, and resource sharing between private entities, NGOs, and the government. | ML (risk scoring, disruption detection); Knowledge representation (supply chain mapping); NLP (event monitoring, intelligence sharing) | AI products provide information inputs to private sector and P3s rather than managing the partnerships. |

NOTE: BEOC = business emergency operations centers; NGO = nongovernmental organization; P3 = public-private partnership.

APPENDIX C

# Preparedness use cases and AI-related patterns

Table C.1

| USE CASE | WHAT THE USE CASE COVERS | DOMINANT AI TECHNIQUES | WHAT CURRENT PRODUCTS ENABLE |
|---|---|---|---|
| **Program Governance, Authorities, and Administration** **44 products** | Tasks in this area are to establish the organizational backbone of preparedness. They cover the designation of an EM entity and leader; the authority and responsibility to coordinate mitigation, response, and recovery activities for the jurisdiction; the development of fiscal and administrative procedures that work before, during, and after disasters, including those needed to request, receive, and manage funds; and tracking and addressing legislative and regulatory changes that affect EM programs, use cases, and activities. | Generative AI (document drafting, legislative analysis, policy Q&A); NLP (regulatory monitoring, contract extraction, natural-language search); ML (compliance scoring, risk classification); Knowledge representation (rules engines, eligibility logic) | AI primarily reduces the administrative burden of maintaining an EM program: tracking regulatory changes, managing contracts, processing grants, and maintaining records. Generative AI assistants are rapidly entering this space, enabling staff to query policy documents and draft correspondence. The legislative tracking cluster is notable for predicting bill outcomes and summarizing regulatory impacts. |

| USE CASE | WHAT THE USE CASE COVERS | DOMINANT AI TECHNIQUES | WHAT CURRENT PRODUCTS ENABLE |
|---|---|---|---|
| **Hazard Identification and Vulnerability Assessment**<br>**44 products** | Tasks in this area are to systematically identify the full scope of natural and human-caused threats and hazards that may affect the jurisdiction and assess who and what is vulnerable to those threats. They cover gathering and analyzing technical, spatial, demographic, land-use, economic, transportation, and environmental data; identifying hazards through multiple sources (e.g., historical records, scientific studies, subject-matter expertise); profiling each hazard to understand its characteristics, frequency, magnitude, and geographic extent; assessing the vulnerability of people, property, critical infrastructure, the environment, and EM operations to identified hazards; identifying community strengths and constraints; and determining the stakeholders who need to be engaged throughout the assessment process. | ML and predictive modeling (dominant—risk scoring, catastrophe modeling, climate projection); CV (building detection, imagery analysis, property assessment); Knowledge representation (hazard classification frameworks) | AI is fundamentally transforming hazard and vulnerability assessment by enabling property-level risk scoring at a national scale—what previously required field visits or coarse zone-based estimates. The insurance industry has driven much of this innovation, and government EM programs increasingly access the same data. The core AI technique is combining aerial and satellite imagery with ML models trained on historical loss data. |

| USE CASE | WHAT THE USE CASE COVERS | DOMINANT AI TECHNIQUES | WHAT CURRENT PRODUCTS ENABLE |
|---|---|---|---|
| **Risk Assessment**<br>**54 products** | Tasks in this area are to create and maintain a repeatable, jurisdiction-wide picture of risk by analyzing the likelihood and consequences of the threats and hazards identified through hazard identification and vulnerability assessment. They cover estimating the probability and potential impact of each hazard across multiple dimensions; establishing context-specific capability targets; mapping and analyzing critical supply chains to identify vulnerabilities, interdependencies, and single points of failure; conducting outreach with supply chain partners; and linking supply chain risk findings to distribution management planning. The risk assessment process drives prioritization across all preparedness activities and should be updated periodically as conditions change. | ML and predictive modeling (nearly universal—probability estimation, consequence modeling, risk scoring); NLP (event monitoring, intelligence extraction); Generative AI (risk summarization) | Risk assessment is where ML and predictive modeling are most purely expressed—the task is fundamentally about estimating probability and consequence. AI enables continuous, automated risk scoring that updates with new data and replaces periodic manual assessments. The supply chain risk cluster is notable for monitoring thousands of global data sources 24/7 to detect risks before they materialize. The connection between risk assessment and capability/resource planning is weakly automated: Risk scores are produced, but their translation into preparedness requirements is largely manual. |

| USE CASE | WHAT THE USE CASE COVERS | DOMINANT AI TECHNIQUES | WHAT CURRENT PRODUCTS ENABLE |
|---|---|---|---|
| **Capacity and Capability Analysis**<br>**14 products** | Tasks in this area are to evaluate jurisdictional mitigation, response, and recovery capacity and capability against the results of the hazard identification, vulnerability assessment, and risk assessment processes. They also establish capacity and capability gaps. The results are used to drive preparedness efforts in the areas of planning and organizing, training, exercises, and resource management. | ML (skills matching, gap analysis, resource optimization); NLP (skills extraction, plan analysis); Generative AI (capability report generation) | This is the most underserved use case across all 45 use cases in the framework. The gap between what the use case definition calls for—evaluating mitigation, response, and recovery capacity against assessed risks and establishing capability targets—and what products deliver is significant. Most products address workforce capability (skills inventories) rather than operational capability (Can we evacuate 100,000 people in 12 hours? Can we shelter 50,000? Do we have enough swift-water rescue teams?). |
| **Integrated Preparedness Planning and Plan Synchronization**<br>**30 products** | Tasks in this area are to develop, integrate, and maintain the full suite of plans that a jurisdiction needs to mitigate, respond to, and recover from identified threats and hazards. Planning involves getting leadership buy-in, mapping the community to identify stakeholders, gathering data to inform a shared fact base, developing plans (including structures, processes, tactics, strategies, and/or projects), synthesizing information, identifying resources, implementing and monitoring plans, and maintaining and updating plans. Organizing encompasses establishing, staffing, and maintaining the organizational structures and administrative foundations needed to coordinate mitigation, response, and recovery. | Generative AI (plan drafting, conversion); NLP (document analysis, search); Knowledge representation (plan structure and logic); ML (scenario-based resource identification) | Generative AI is having the most transformative impact on this use case—converting legacy plans from static documents into structured data, generating plan components from prompts, and enabling natural-language interaction with plan content. |

| USE CASE | WHAT THE USE CASE COVERS | DOMINANT AI TECHNIQUES | WHAT CURRENT PRODUCTS ENABLE |
|---|---|---|---|
| **Resource Management, Mutual Aid, Logistics, Distribution, and Supply Chain Resilience**<br>**44 products** | Tasks in this area are to prepare to manage personnel, teams, facilities, equipment, and supplies before, during, and after incidents by identifying and typing resources, credentialing personnel, planning for resource acquisition and inventory, and building mutual aid mechanisms to obtain resources the jurisdiction does not own. They cover defining mutual aid agreement provisions (e.g., reimbursement, licensure recognition, mobilization procedures, interoperability protocols, and resource packaging standards). | ML (risk scoring, demand forecasting, credential verification); Knowledge representation (supply chain graphs, compliance rules); NLP (contract analysis, regulatory monitoring); Planning, scheduling, and optimization (warehouse operations, workforce scheduling) | AI is strongest in the supply chain resilience component—monitoring suppliers, mapping dependencies, and detecting risks. Credentialing is emerging with AI verification. |

| USE CASE | WHAT THE USE CASE COVERS | DOMINANT AI TECHNIQUES | WHAT CURRENT PRODUCTS ENABLE |
|---|---|---|---|
| **Community Engagement and Whole Community Partnerships**<br>36 products | Tasks in this area are to build, maintain, and leverage relationships with the full scope of whole-community stakeholders—individuals, families, faith-based organizations, community-based organizations, nonprofit groups, advocacy organizations, schools and academia, businesses, and media outlets—to strengthen collective preparedness and expand capacity for mitigation, response, and recovery. They cover engaging faith-based and community organizations as partners, building private-public partnerships, conducting public preparedness education campaigns, ensuring preparedness activities address the access and functional needs of underserved populations, and integrating community stakeholders into planning processes. | NLP (dominant—translation, sentiment analysis, chatbot conversation); Generative AI (content creation, video generation); ML (feedback analysis, engagement optimization) | AI addresses the language and accessibility barriers that limit whole-community engagement. Real-time translation and chatbots (available 24/7 in multiple languages) extend reach far beyond traditional town halls. The "partnership building" component (engaging faith-based organizations, building public-private partnerships) remains a fundamentally human activity that AI supports informationally but does not drive. |

| USE CASE | WHAT THE USE CASE COVERS | DOMINANT AI TECHNIQUES | WHAT CURRENT PRODUCTS ENABLE |
|---|---|---|---|
| **Training**<br>37 products | Tasks in this area are to build and sustain the knowledge, skills, and abilities of personnel who have roles and responsibilities in mitigation, response, and recovery. They cover conducting training needs assessments; developing and managing a multiyear training plan aligned with identified capability gaps; employing a progressive approach in which foundational courses build toward more-advanced activities; delivering training on plans, procedures, systems, and equipment across all levels; incorporating training on the access and functional needs of underserved populations; tracking individual and organizational training completions and credential requirements; and using training outcomes to inform exercise design and validate that personnel can execute their assigned responsibilities. | Generative AI (scenario generation, content creation, conversational coaching); NLP (transcription, performance analysis, natural-language coaching); ML (personalized learning paths, performance prediction); Knowledge representation (protocol logic for dispatch training) | AI can generate unlimited, unique training scenarios on demand, replacing the constraint of finite prewritten scripts. AI dispatch simulators provide instant feedback, eliminating the need for dedicated human evaluators for every training session. Virtual reality and extended reality platforms create safe, repeatable environments for high-risk training. AI coaching assistants provide personalized guidance at scale. |

| USE CASE | WHAT THE USE CASE COVERS | DOMINANT AI TECHNIQUES | WHAT CURRENT PRODUCTS ENABLE |
|---|---|---|---|
| **Exercising and Continuous Improvement** 25 products | Tasks in this area are to test and validate capabilities consistent with identified hazards, identify strengths and areas for improvement, and drive continuous improvement. They cover managing a multiyear exercise program using a progressive approach; ensuring broad public participation; developing exercise documentation; conducting exercise evaluation through trained evaluators who assess performance against objectives; performing after-action analysis including trend and root-cause analysis; documenting findings and corrective actions in AARs and improvement plans; tracking the implementation of corrective actions; and using results to inform updates to plans, training priorities, and resource investments. | Generative AI (scenario generation, AAR drafting); NLP (performance analysis, transcription); ML (quality scoring, pattern detection); Knowledge representation (scenario logic, evaluation criteria) | Generative AI automates what was previously a labor-intensive, weeks-long manual process (e.g., scenario development, Master Scenario Events List creation, documentation). After-action analysis products automatically transcribe and analyze exercise communications. |

NOTE: EM = emergency management; NIMS = National Incident Management System.

APPENDIX D

# Observed product gaps

Table D.1 · Where the product landscape is thin — useful when a vendor claims to cover a whole use case.

| FUNCTION | USE CASE | EXAMPLES OF OBSERVED GAPS |
|---|---|---|
| **Response** | **Situational Awareness, Hazard Monitoring, and Information Sharing** | Despite enormous product density, relatively few products specialize in synthesizing information across domains into an integrated common operating picture. Most provide single-domain feeds (weather or satellite or social media). True multi-domain fusion remains concentrated in a handful of platforms. The use case definition emphasizes "maintain and share a common picture," which implies cross-domain synthesis that most products do not independently achieve. |
| **Response** | **Public Information, Alerts, and Protective Guidance** | Few products address protective guidance personalization—tailoring the recommended protective action to a recipient's specific situation (e.g., mobility limitations, location within a flood zone, access and functional needs). Most deliver uniform messages to geographic areas. |
| **Response** | **Protective Action Decision and Implementation** | Integration between hazard modeling (fire and flood) and evacuation management (zones and traffic) is handled by only a few technology companies. Most products cover only one side of the decision. |
| **Response** | **Evacuation and Transportation Operations** | Products primarily optimize vehicle movement rather than the broader evacuation operation (which includes notification, shelter activation, and special population transport). AI is strongest in predictive traffic modeling and real-time signal optimization. The transportation assistance component for access and functional-needs populations is underserved by AI products—no products specifically address the challenge of coordinating paratransit, ambulance, or accessible vehicle fleets during evacuation. |
| **Response** | **On-Scene Security, Access, and Perimeter Control** | The access and perimeter control function is overwhelmingly focused on detection and identification rather than physical access enforcement (e.g., doors, barriers), which remains largely hardware-driven. |
| **Response** | **Search and Rescue** | Few products address the stabilize component of search and rescue—providing medical assessment or treatment guidance at the point of rescue. The link between detection-by-drone and medical triage is largely manual. |

| FUNCTION | USE CASE | EXAMPLES OF OBSERVED GAPS |
|---|---|---|
| **Response** | **Fatality Management Services** | AI products cluster almost entirely on identification. The logistical and compassionate dimensions of fatality management (e.g., morgue operations, family assistance centers, death certificate processing at scale) have minimal AI support. |
| **Response** | **Shelter, Mass Care, and Human Services** | Physical shelter operations (e.g., food, sanitation, supplies distribution) have limited AI penetration. |
| **Response** | **Family Reunification and Welfare Checks** | The traditional welfare check function—dispatching someone to physically verify a person's status—has almost no dedicated AI support. This is a significant gap given the volume of welfare check requests after disasters. |
| **Response and Recovery** | **Volunteer, Donations, and Offers Management** | When we addressed matching of volunteers to task areas, we found only one purpose-built disaster community coordination product to help the organizations that coordinate volunteers and donations work together. We had a similar finding related to donations management. |
| **Response** | **Emergency Debris Clearance and Route Opening** | Debris volume estimation, the prioritization of clearance routes to critical facilities, and the coordination of debris staging—all described in the use case definition—have minimal dedicated AI support. This is a significant gap given that debris removal is typically the largest single cost category in major disaster recovery operations. |
| **Recovery** | **Housing and Shelter Recovery** | Siting and managing temporary housing (FEMA mobile housing units, transitional units)—a major operational challenge—has virtually no dedicated AI support. |
| **Recovery** | **Health, Education, Behavioral Health, and Social Services Recovery** | After a major disaster, tens of thousands of people may need behavioral health support. The AI products available are primarily general-population wellness products or small-scale crisis services. There is virtually no AI product that specifically addresses the need to deploy and scale disaster-specific behavioral health services (e.g., psychological first aid, grief counseling, long-term trauma treatment) to a suddenly affected population at scale. AI-assisted triage (e.g., Crisis Text Line's AVA algorithm) is the closest capability, but it was not designed for post-disaster population-level deployment. |
| **Recovery** | **Individual and Household Assistance and Case Management** | The "coordination among multiple providers around a single survivor" function—true multiagency case coordination—remains weakly automated. Most case management platforms track a single organization's interactions rather than orchestrating across the full network of providers serving one household. |
| **Recovery** | **Economic and Workforce Recovery** | Small business–lending AI could significantly accelerate SBA disaster loan processing, but most products target general commercial lending rather than disaster-specific programs. |

| FUNCTION | USE CASE | EXAMPLES OF OBSERVED GAPS |
|---|---|---|
| **Recovery** | **Debris, Waste, and Environmental Safety Management** | Debris volume estimation from satellite or aerial imagery, priority route clearance planning, contractor management, and debris monitoring site operations—core debris management functions—have almost no purpose-built AI products. |
| **Recovery** | **Natural and Cultural Resources Restoration** | The products are primarily monitoring and assessment products rather than restoration execution products. The connection to cultural resources (e.g., historic sites, archaeological preservation) is essentially absent from the product landscape. |
| **Recovery** | **Resource, Logistics, and Supply Chain Management for Recovery** | AI products overwhelmingly come from commercial supply chains and logistics and are adapted for recovery rather than being purpose-built. The strongest AI capability is in disruption detection and adaptive replanning—when a supplier fails or a route closes, AI identifies alternatives. Purpose-built humanitarian logistics products that also model disaster-specific constraints are rare (e.g., road closures, points of distribution operations, needs matching from social media). |
| **Recovery** | **Volunteer, Donations, and Community Support Coordination** | When we addressed matching of volunteers to task areas and tracking, we found only one purpose-built disaster community coordination product to help the organizations that coordinate volunteers and donations work together. |
| **Recovery** | **Land Use, Rebuilding, and Mitigation Planning Through Recovery** | AI support for politically sensitive decisions—buyout programs, land-use changes, zoning updates—is limited to data provision rather than decision support. |
| **Recovery** | **Private-Sector and Public-Private Partnership Recovery Coordination** | This is one of the least developed use cases in terms of AI products. Most products are commercial supply chain or business continuity products rather than purpose-built partnership coordination platforms. |
| **Preparedness** | **Risk Assessment** | The connection between risk assessment and capability and resource planning (called for in the use case definition) is weakly automated—risk scores are produced, but their translation into preparedness requirements is largely manual. |
| **Preparedness** | **Capacity and Capability Analysis** | This is the most underserved use case across all 45 use cases. The gap between what the use case definition calls for (evaluating mitigation, response, and recovery capacity against assessed risks and establishing capability targets) and what the products deliver is significant. Most products address workforce capability (e.g., skills inventories) rather than operational capability (e.g., Can 100,000 people be evacuated in 12 hours? Can 50,000 people be sheltered? Are there enough swift-water rescue teams?). The explicit linking of capacity gaps to preparedness efforts (e.g., planning, training, exercises) is essentially unautomated. |

| FUNCTION | USE CASE | EXAMPLES OF OBSERVED GAPS |
|---|---|---|
| **Preparedness** | **Integrated Preparedness Planning and Plan Synchronization** | The synchronization aspect (e.g., ensuring that emergency operations plans, continuity of operations plans, hazard-specific annexes, mutual aid agreements, and recovery plans are consistent) remains primarily a human coordination task, with AI providing search and comparison support. |
| **Preparedness** | **Resource Management, Mutual Aid, Logistics, Distribution, and Supply Chain Resilience** | The traditional EM resource management functions (e.g., NIMS resource typing, mutual aid activation, resource ordering and tracking) have less AI penetration than commercial supply chain management. Credentialing is emerging with AI verification, but the licensure recognition and interoperability protocol challenges described in the use case remain primarily procedural. |
| **Preparedness** | **Exercising and Continuous Improvement** | The use case definition calls for a multiyear exercise program with strategic sequencing. No AI products address exercise program strategy—what to exercise, in what order, and with what objectives based on assessed risks and capability gaps. |

**A note on these findings:** the counts and shares describe the AI product landscape as reviewed, not any single product in front of you. Use them to calibrate expectations and to ask sharper questions — not as a score.

**Source:** Jensen, Jessica, Jessie Riposo, Leah Dion, and Glen L. Woodbury, *AI and the Future of Emergency Management: Market Supply and Adoption Pathways*. Santa Monica, CA: RAND Corporation, RR-A4625-1, 2026. rand.org/pubs/research_reports/RRA4625-1.html