

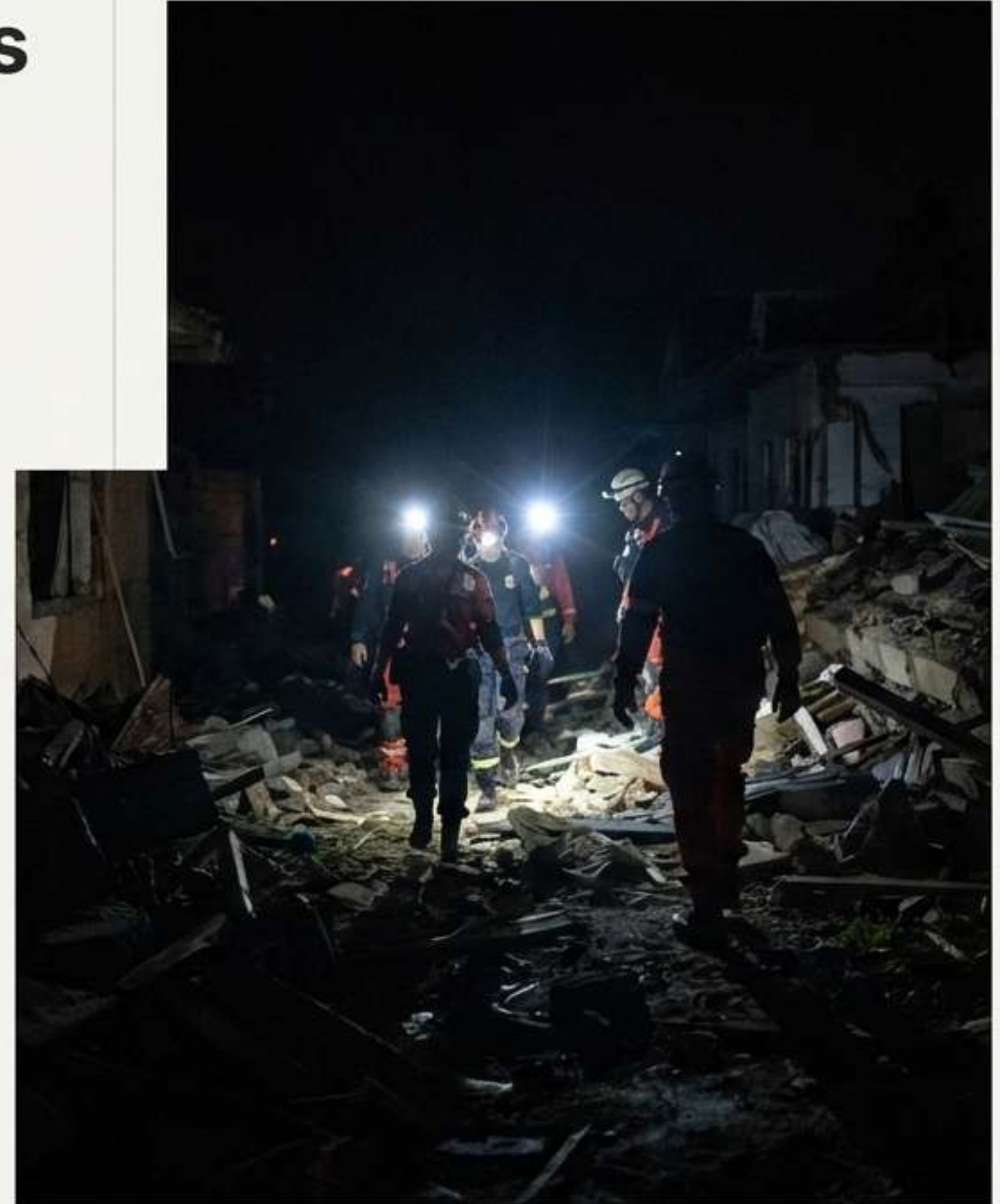


Closing the Information Gap: Aerial LiDAR for Initial Flood Assessment

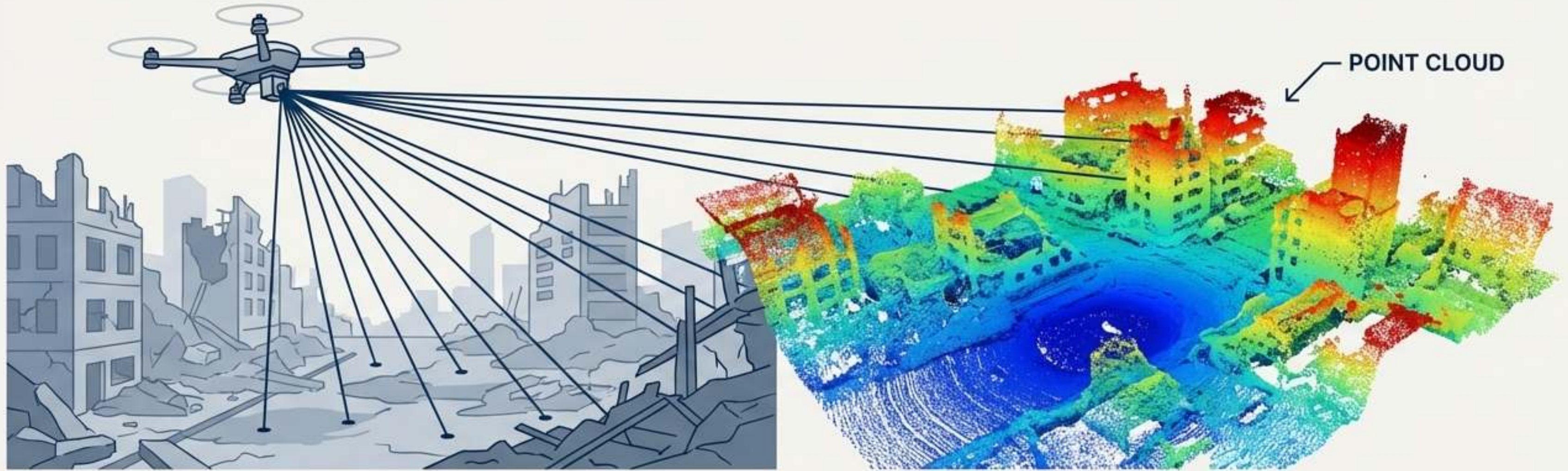
An Operational Briefing for the American Red Cross

The Challenge: Critical Decisions Decisions in an Information Vacuum

- Ground access is limited or **impossible** due to floodwaters and debris.
- Structural stability of homes is **unknown**, posing a high risk to assessment teams.
- Operations are **halted at nightfall**, losing valuable time in the critical “golden hours”.
- Situational awareness is **fragmented**, leading to inefficient and reactive resource deployment.



A New Capability for High-Fidelity Situational Awareness



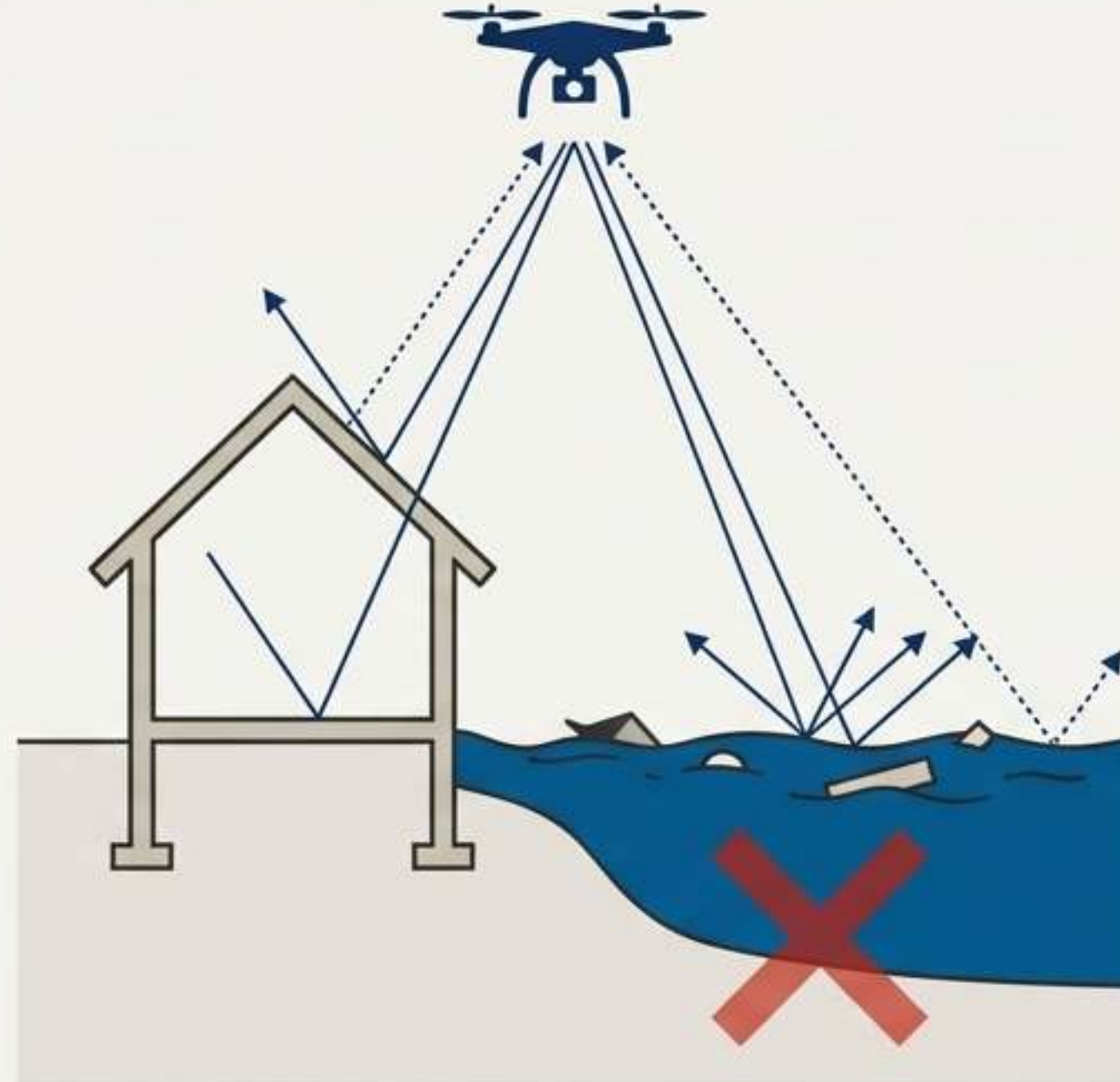
- ☀️ LiDAR (Light Detection and Ranging) uses pulses of laser light to measure distances with high precision.
- 🌙 This process creates incredibly detailed 3D maps, called “point clouds,” of the ground and structures.
- 🚁 Crucially, it is not dependent on sunlight and allows for high-fidelity data collection in complete darkness.

The Reality of LiDAR and Water: A Critical Limitation

Core Message:

Topographic LiDAR does not reliably penetrate standing water.

In Source Serif Pro Regular
The laser pulse is designed to map solid surfaces; it is reflected or absorbed by the water's surface, preventing measurement of the ground beneath.



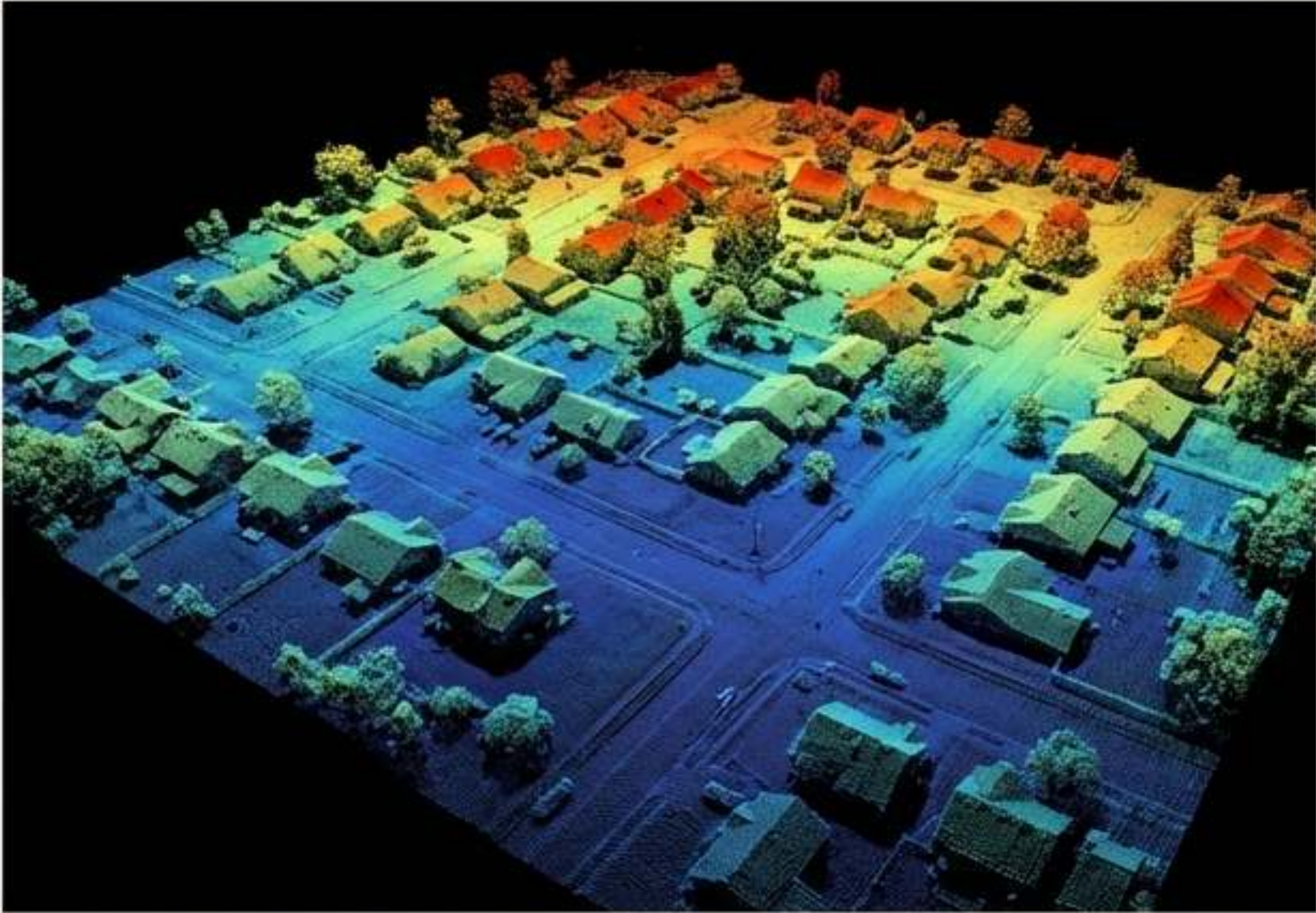
Clarification on Exceptions

In rare cases of very shallow, clear water with strong bottom reflectance, you may see low-confidence returns.

However:

- These are **not consistent** or guaranteed.
- They are **not survey-grade**.
- They **must not be used** for official flood depth determination.

Its True Power: Mapping the 'Dry Side' of the Flood



While direct water depth is not measured, LiDAR's power lies in precisely mapping everything above and around the waterline. It delivers a high-resolution 3D point cloud of:

- Building exteriors (roofs, walls, foundations)
- The ground surface immediately around structures
- Roads, yards, slopes, and critical drainage paths

This is essential for understanding flood **exposure** and **risk context** for individual homes.

Sub-10cm Vertical Accuracy Enables Precise Risk Assessment



This level of accuracy provides actionable intelligence for assessment planners and GIS staff by enabling them to:



- Create precise elevation models to identify low-lying, high-risk structures.



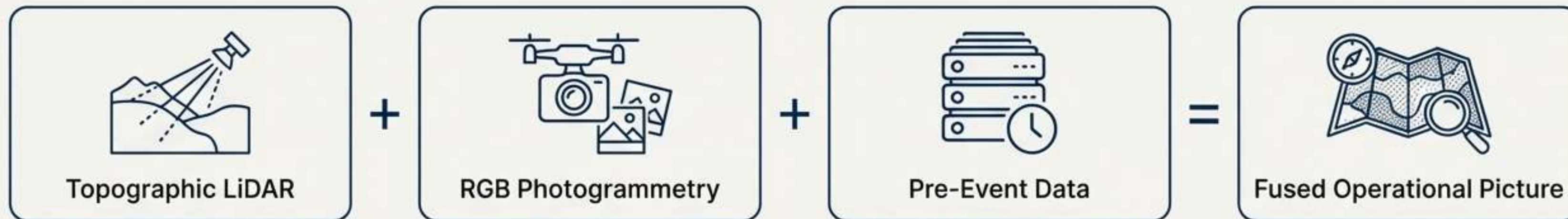
- Compare post-event data with pre-event terrain models to quantify topographic changes.



- Identify potentially inaccessible routes or flood-prone parcels **before** deploying ground teams.

Strength Through Integration: A Fused Data Approach

Optimal situational awareness comes from combining data sources. The true strength is in the fusion:



This fusion produces accurate above-water 3D building models, textured visual context for decision-makers, and strong inputs for damage triage and prioritization.

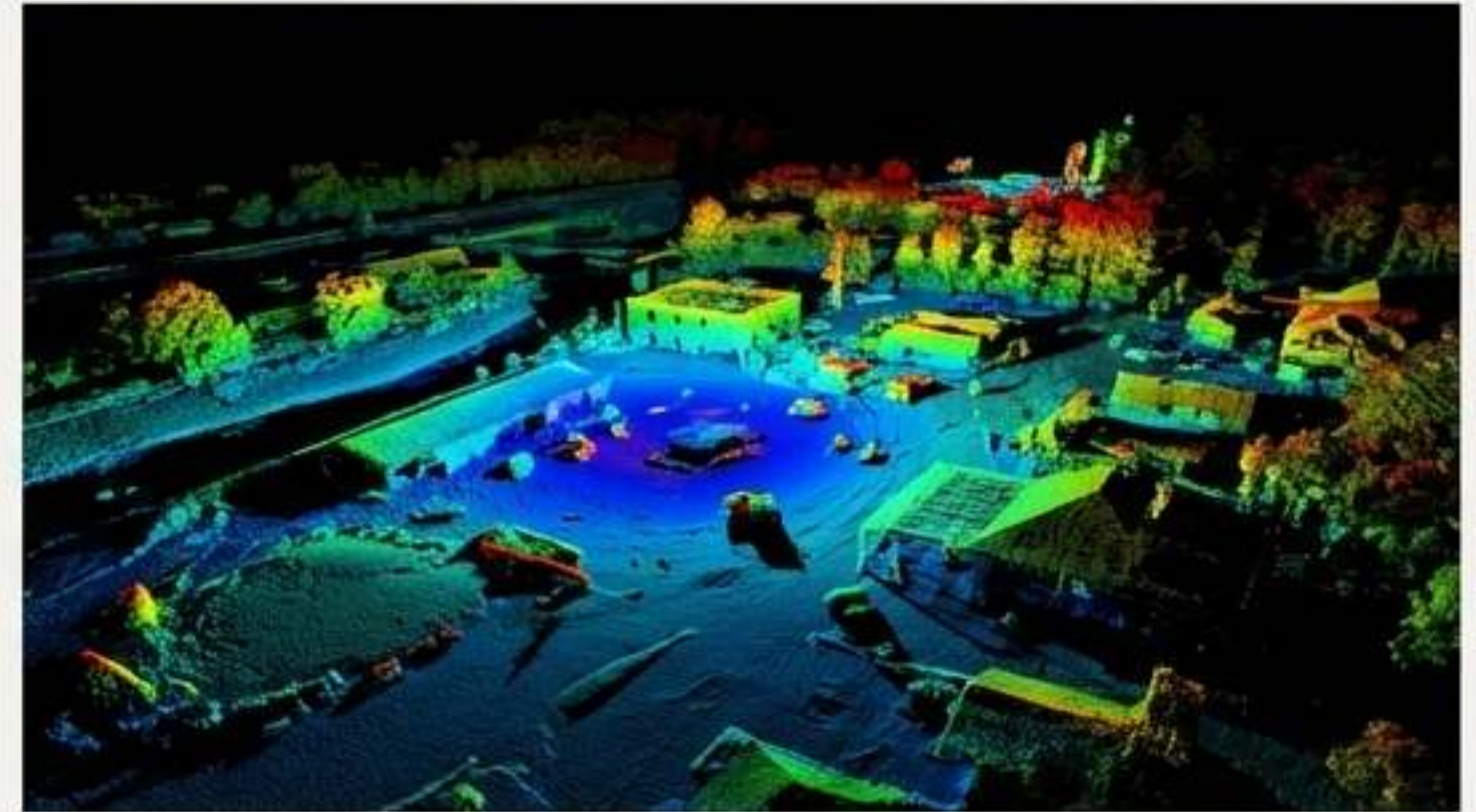
Redefining the First 48 Hours of Flood Response

BEFORE (Traditional Methods)



- Operations stop at nightfall
- High risk for volunteers
- Slow, manual, house-by-house assessment
- Fragmented situational awareness

AFTER (with Aerial LiDAR)



- 24/7 continuous operations
- Personnel operate from a **safe distance**
- **Rapid, large-scale** assessment in minutes
- Complete, **actionable** operational picture

Decision Advantage: Faster, Safer, and Smarter Deployment



FASTER: Map Square Miles in a Single Flight.

A single 30-40 minute flight can map up to **1 square mile**, assessing **750 to 3,700 homes** at once.



SAFER: Assess from a Safe Distance.

Keep volunteers out of harm's way by remotely assessing unstable structures and hazardous zones cut off by flooding.



SMARTER: Turn Night into an Advantage.

The 'golden 48 hours' no longer stops at sundown. Continue critical assessment operations around the clock to accelerate the entire response cycle.

A Force Multiplier, Not a Silver Bullet



WHAT IT IS

- A rapid situational awareness tool for the first 48–72 hours.
- A high-precision method for mapping terrain, structures, and risk context.
- A critical asset for reducing risk to personnel.



WHAT IT IS NOT

- A water-depth measurement system.
- A replacement for ground assessment teams.

THE OPERATIONAL TAKEAWAY: It enables **smarter deployment** of ground teams by providing a clear picture of *where* to go, *what* to expect, and *which routes* are safe.



Comments or More Information

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Appendix: Technology Specifications



System: DJI Zenmuse L3

Key Features for GIS Staff:

- **LiDAR Sensor:** 1535nm Long-Range LiDAR (effective for various surface types).
- **Visual Sensor:** Dual 100MP RGB Mapping Cameras (for integrated photogrammetry).
- **Accuracy:** Achieves sub-10 cm vertical accuracy for precise elevation modeling.
- **Penetration:** Up to 5 returns per laser pulse allow it to see through canopy and smoke to map ground and structure beneath.