



AI-Driven National Synthesis Hub for Convergent Disaster Research and Intelligence



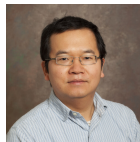
Hui Fang

information retrieval
domain-specific search
AI-driven synthesis



Valerie Marlowe

disaster archives
collections stewardship
Quarantelli Collection



Xiaoming Li

high-performance computing
AI compute optimization
large-scale data processing

University of Delaware

Disasters cannot be rerun:

Archives are the laboratories of disaster science

No prediction. No controlled replication.
The record of past events is the only laboratory the field has.

"America's leadership in artificial intelligence depends not only on advanced computing resources but also on the data infrastructure..."

— NSF, announcing this round of IDSS awards

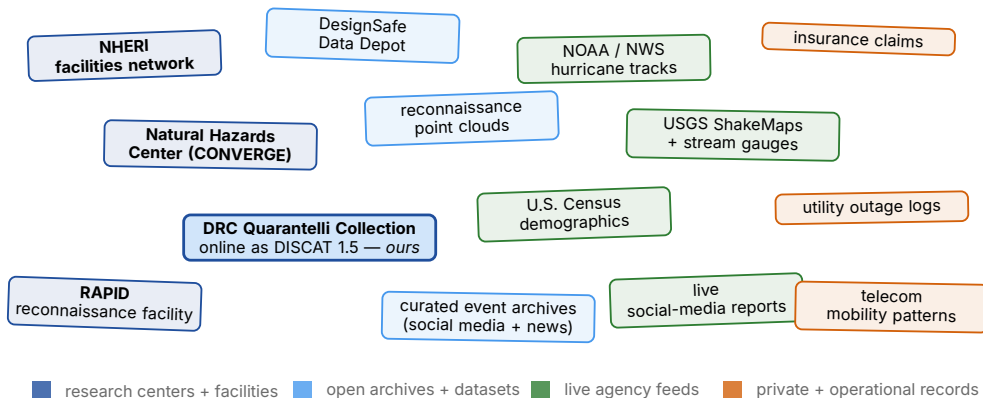
University of Delaware has run that laboratory since 1963:

Disaster Research Center (DRC)

- ▶ **The world's first disaster research center** — founded 1963
 - ▶ 700+ field deployments, shaping modern emergency management protocols and disaster policy
- ▶ **The world's leading disaster archive** — the E.L. Quarantelli Resource Collection
 - ▶ publications, archival items and artifacts
- ▶ **A live research instrument** — DISCAT 1.5 / InfoChain, from our prior NSF award
 - ▶ research-grade retrieval serving disaster researchers, policy makers, and emergency managers worldwide
 - ▶ run live by DRC teams after Hurricane Harvey and the Hawaii missile false alarm

Beyond DRC, the field is rich but scattered.

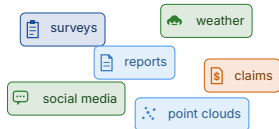
Every source is an island



Three structural limits

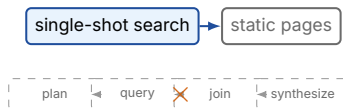
Hold current effort **below national scale**

1 The sources are not integrated



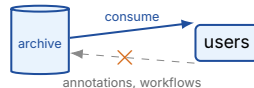
each data type sits in its own silo — the insight lives in their combination

2 No AI-driven workflows



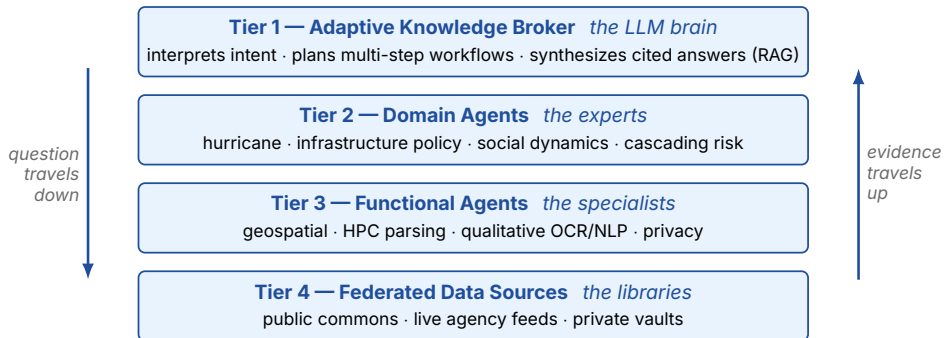
single-shot search over pages no machine can act on — the multi-step agent chain has no layer to run on

3 Users consume, but cannot contribute



knowledge flows one way — expert workflows and annotations have nowhere to go, so expertise never accumulates

DISCAT 2.0 answers with four tiers of cooperating AI agents



An example scenario: **real-time triage of critical infrastructure**

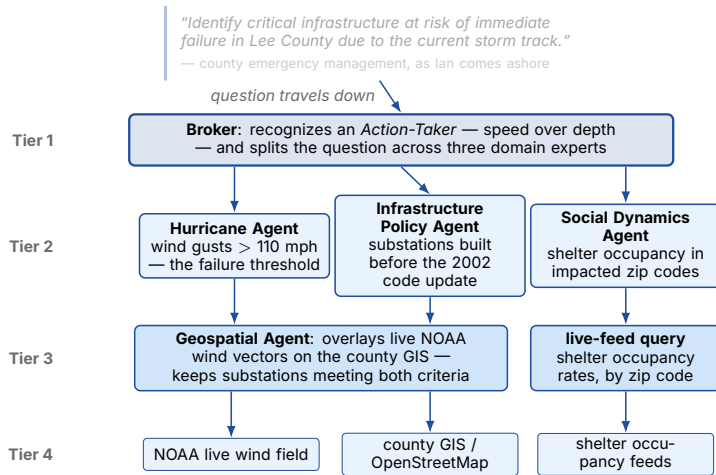
September 28, 2022, Lee County, Florida — Hurricane Ian landing: Category 4, 150-mph winds

"Identify critical infrastructure at risk of immediate failure in Lee County due to the current storm track."

— county emergency management, as Ian comes ashore

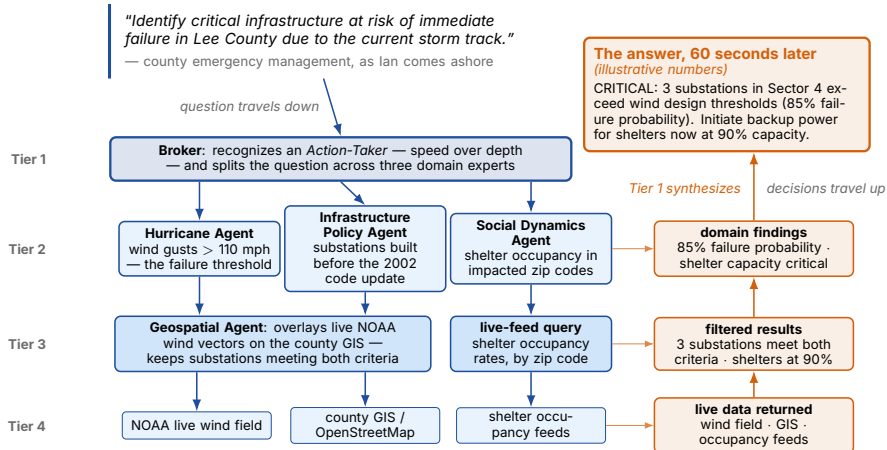
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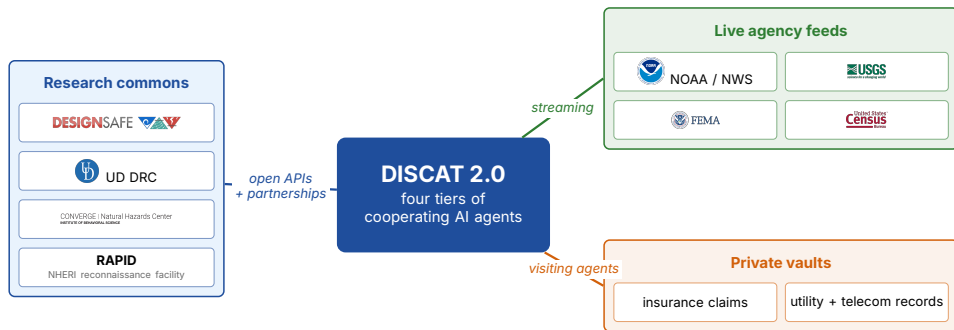
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The vision:

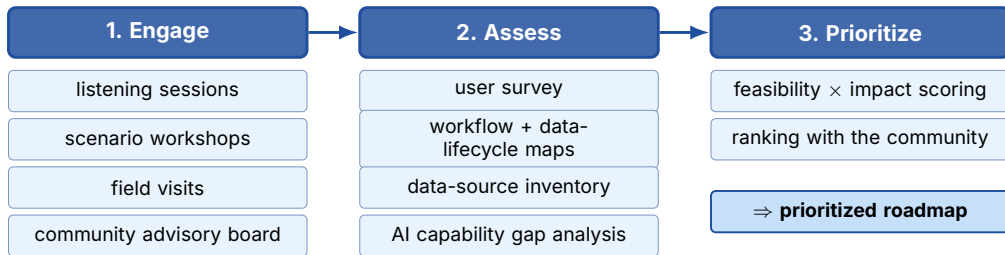
One fabric across the sources the nation already trusts



Private vaults join through visiting agents — no raw record ever crosses the wall.

Two planning years

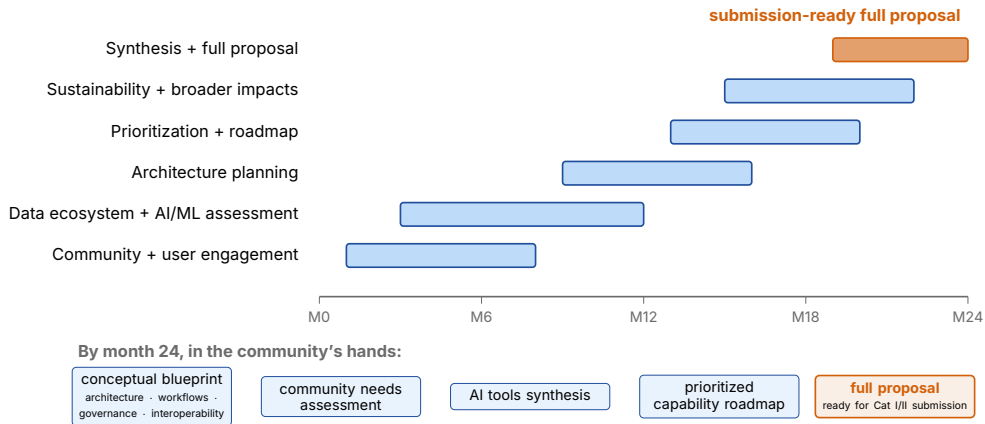
De-risk the AI transition



Wizard-of-Oz AI prototyping — runs throughout: stakeholders pose real queries to a simulated broker

Month 24 delivers

A blueprint — and a submission-ready full proposal



DISCAT 2.0: An AI-Driven Synthesis Hub for Disaster Research

From proven pilot to national instrument

- ▶ **Done** — a proven pilot (DISCAT 1.5) serving a national community from the world's leading disaster archive; a four-tier AI architecture designed; the IDSS planning project awarded
- ▶ **This project, 24 months** — engage, assess, prototype, prioritize $\Rightarrow$ the community-informed blueprint: a federation designed (API standards, governance, data agreements) and a submission-ready full proposal
- ▶ **Next** — the Category II coalition forms here: join a workshop, the community advisory board, or a data partnership

Planning grants "support the development of future data infrastructure proposals under Category I and II" (NSF award announcement, 2026). Category II: "transition of established ...pilot ...systems and services to national-scale production" (NSF 25-544).