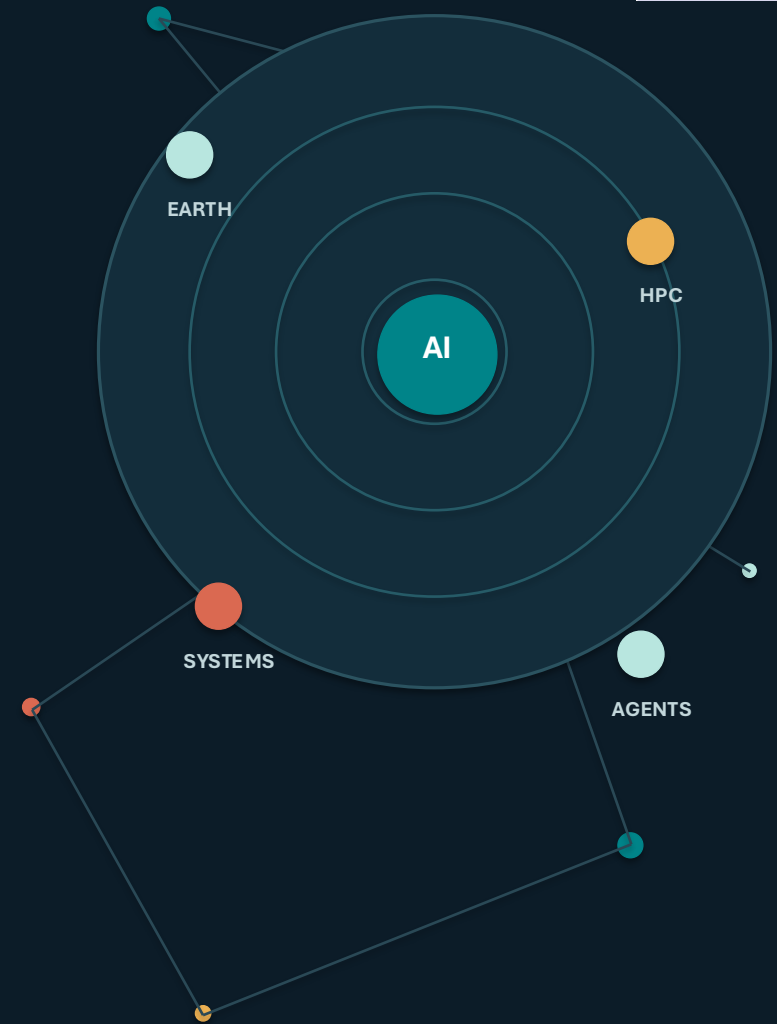


RESEARCH AFTER THE AI-AGENT SHIFT

From ideas to working systems?

Remote sensing · AI agents · HPC · distributed systems



PhD Retreat · 14 October 2026

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Will AI move research from papers to prototypes?

A possible change in the unit of progress

PAPER-FIRST

Idea — Analysis — Paper

Contribution is argued and assessed primarily through written evidence.

PROTOTYPE-LED

Idea — Build — Test — Paper

Executable evidence: a system, measurable behaviour, limits and reproducibility.

INDUSTRY PULL

Faster routes to useful capability may reward research that can be built, tested and demonstrated.

Question for discussion: does this change the bar for a PhD contribution?

National resilience: digital twins and autonomous response

Research prototypes can connect planning models with systems that can be exercised in realistic conditions.

01

PROTECT

CERT-IS digital twins

Cyber-range models for critical infrastructure; test AI-assisted detection and response.

02

PREDICT

Remote sensing + HPC

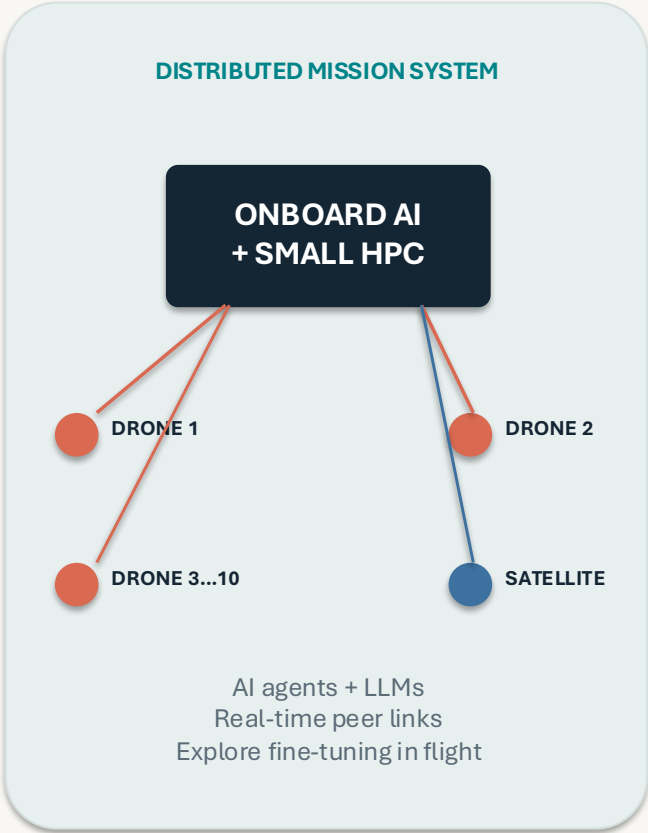
Combine observations and hazard models for faster prediction and simulation.

03

RESPOND

3 → 10 autonomous units

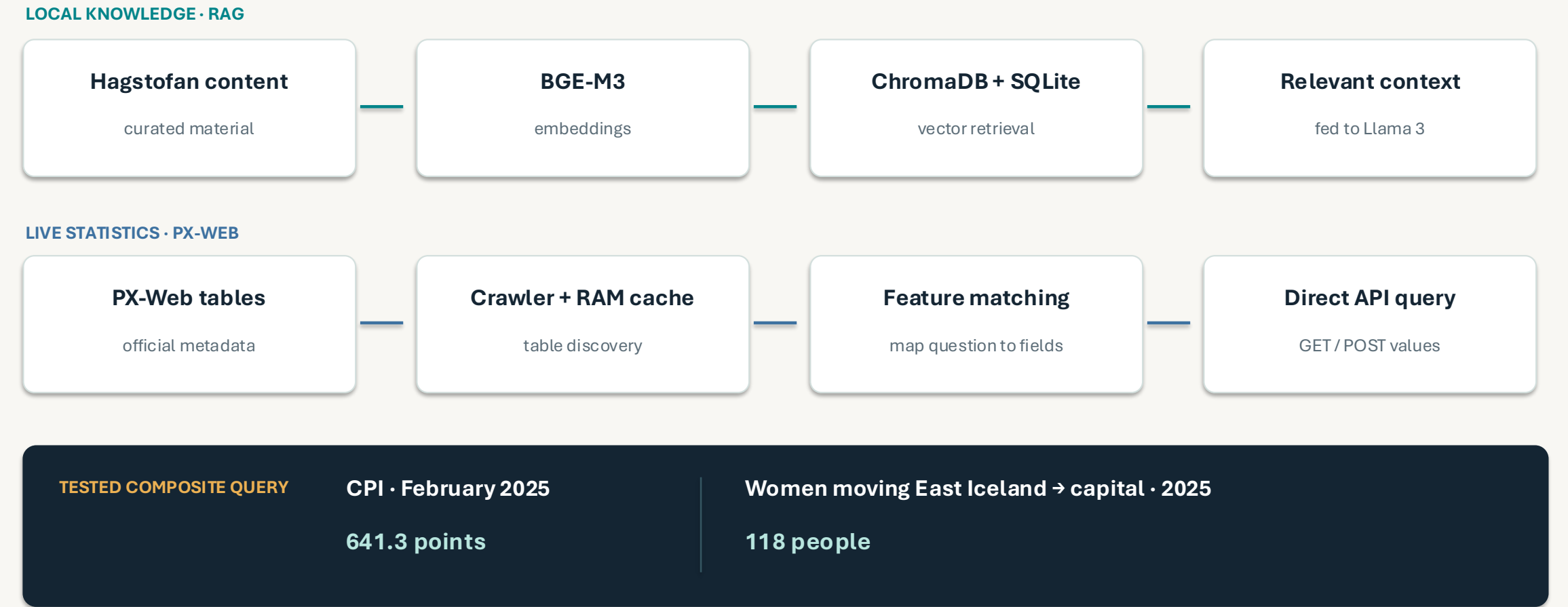
Communicating drones for search and rescue; satellite nodes are another option.



Research tests: autonomy · communication latency · energy · resilience · safe model adaptation

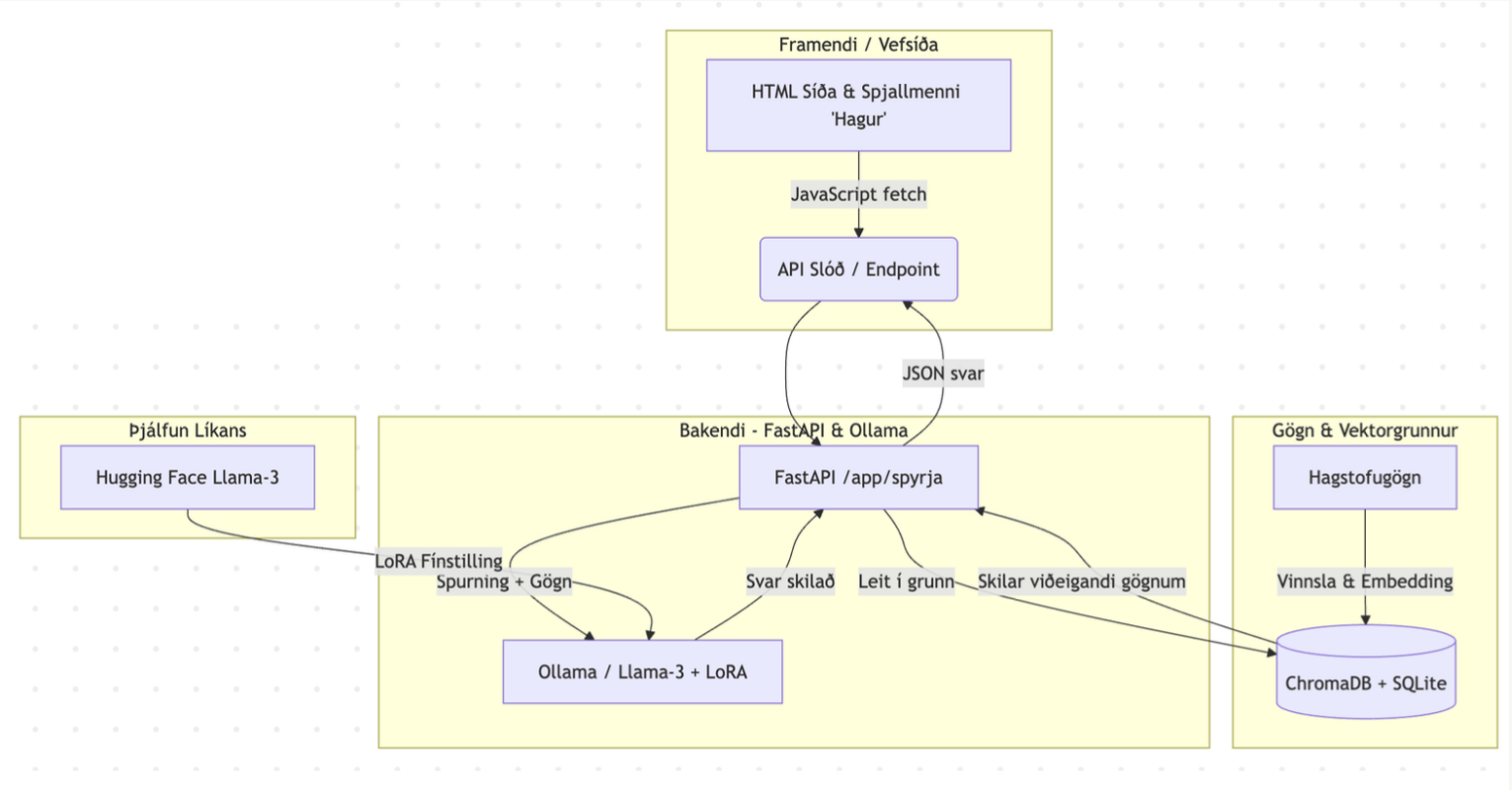
Hagur: one assistant, two routes to official data

Hagur is a domain-specific AI-agent prototype. Its backend provides MCP-like functionality by routing questions between the RAG index and live PX-Web queries, combining results from multi-part questions, and passing grounded context to fine-tuned Llama 3 + LoRA.



Hagur architecture: retrieval, orchestration, answer

The backend combines relevant context or live statistics, then passes the grounded context to Llama 3 + LoRA.



MODEL

Llama 3 8B + LoRA, tuned on ~300 domain-specific examples; adapter adds only a few million parameters.

LIVE NUMERICAL PATH

FastAPI filters PX-Web metadata and caches it in RAM. Numeric queries bypass vector search; RAG remains for context. Tested figures matched source values.

What changes for PhD research?

THE BAR MAY RISE

A PhD may need to do more than explain an idea.

It may also need to build, measure, compare and reproduce it.

Risk: implementation effort can crowd out the research question.



REMOTE SENSING

Turn Earth observations into timely, useful signals.



AI AGENTS

Make systems that plan, call tools and know when to defer.



HPC + DISTRIBUTED SYSTEMS

Scale models and coordinate computation across nodes and devices.



TAILORED OPERATING SYSTEMS

Co-design runtime, scheduling, energy and safety for the task.

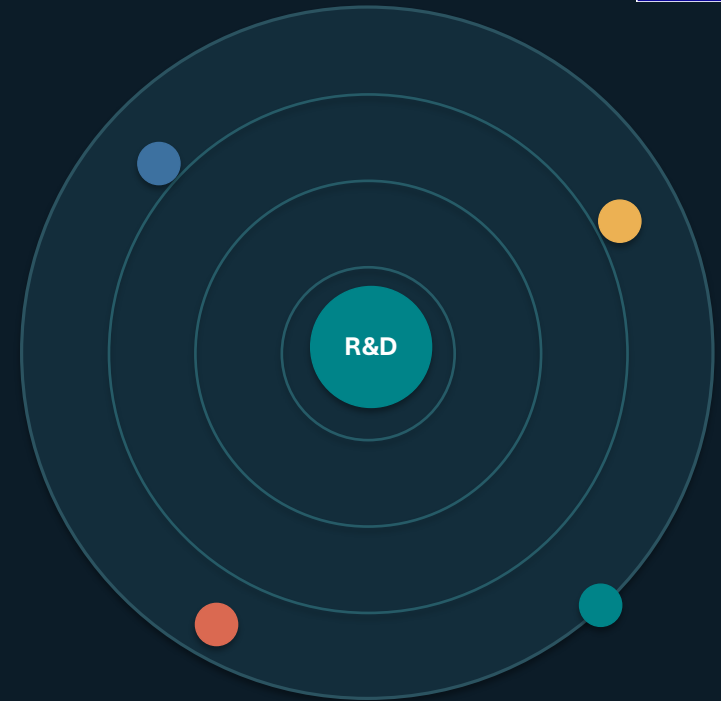
Good PhD work still needs a clear question, novelty and rigorous evaluation.

THE PAPER REMAINS. THE EVIDENCE EXPANDS.

AI agents and accessible HPC make it easier to test ideas in real systems.

Hagur makes that shift concrete: a domain-specific assistant grounded in Statistics Iceland data, through local retrieval or live PX-Web queries.

[Live demo: hingolfur.github.io/hagstofa-ai-demo/](https://hingolfur.github.io/hagstofa-ai-demo/)



Build to learn. Measure to know. Write to explain.

Thank you · Discussion