

# The AI Revolution in Science

*AI agents and a DGX Spark massively amplify what an individual or small team can accomplish.*

David M. Hall — Senior Research Scientist & DevRel, NVIDIA  
EGU General Assembly • Vienna • April 2026

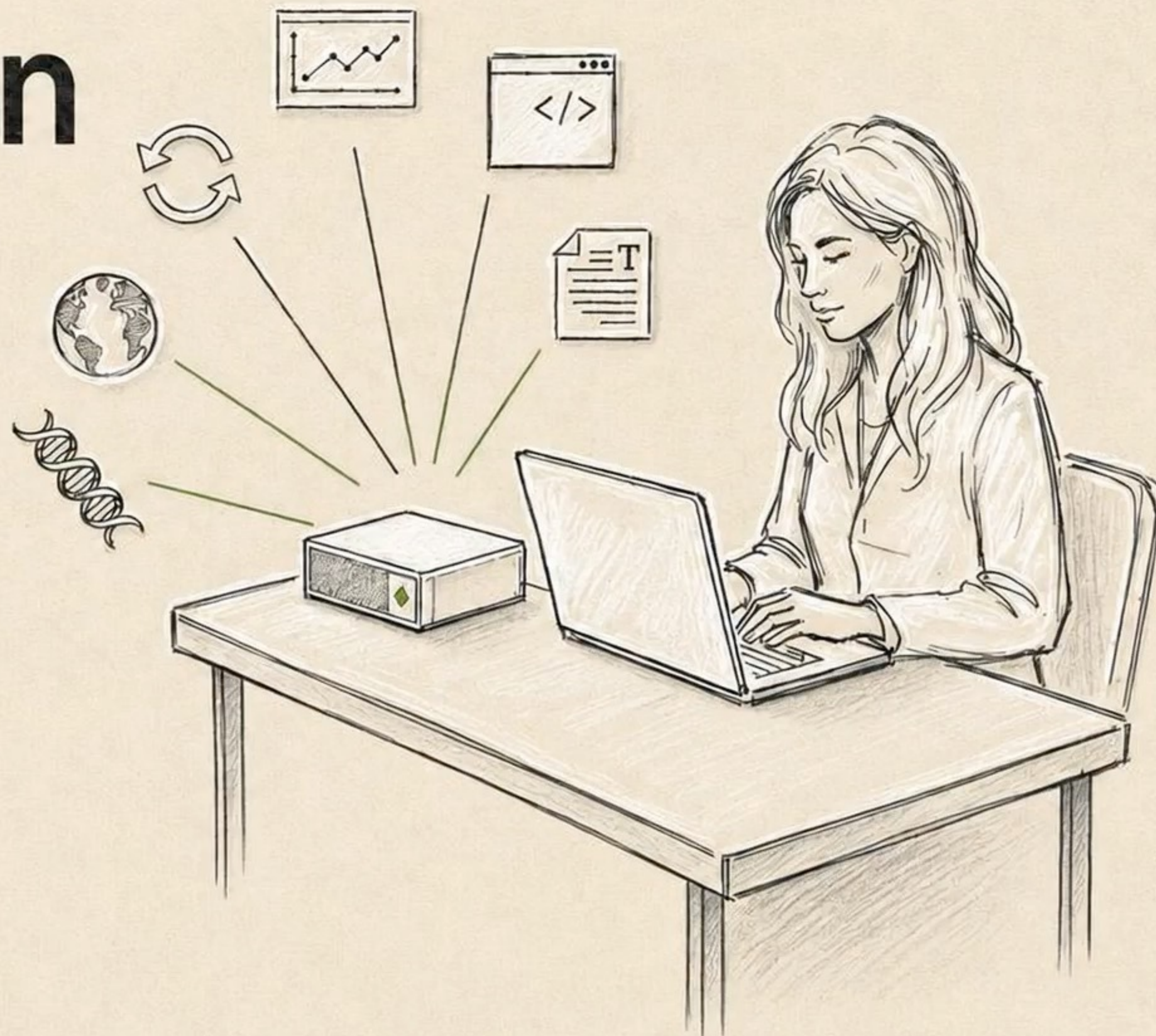


FIG. 1 - The individual researcher and their compute.

# AI amplifies what one person can do

AI assistants turn the individual contributor into the orchestrator of an army of intelligent agents.

- One person, many agents — each working at 100x human speed
- Agents do more than code — research, documents, math, brainstorming
- The tools are here today: Claude Code, OpenAI Codex, Cursor, Hermes

*Showing beats telling — so I built things.*

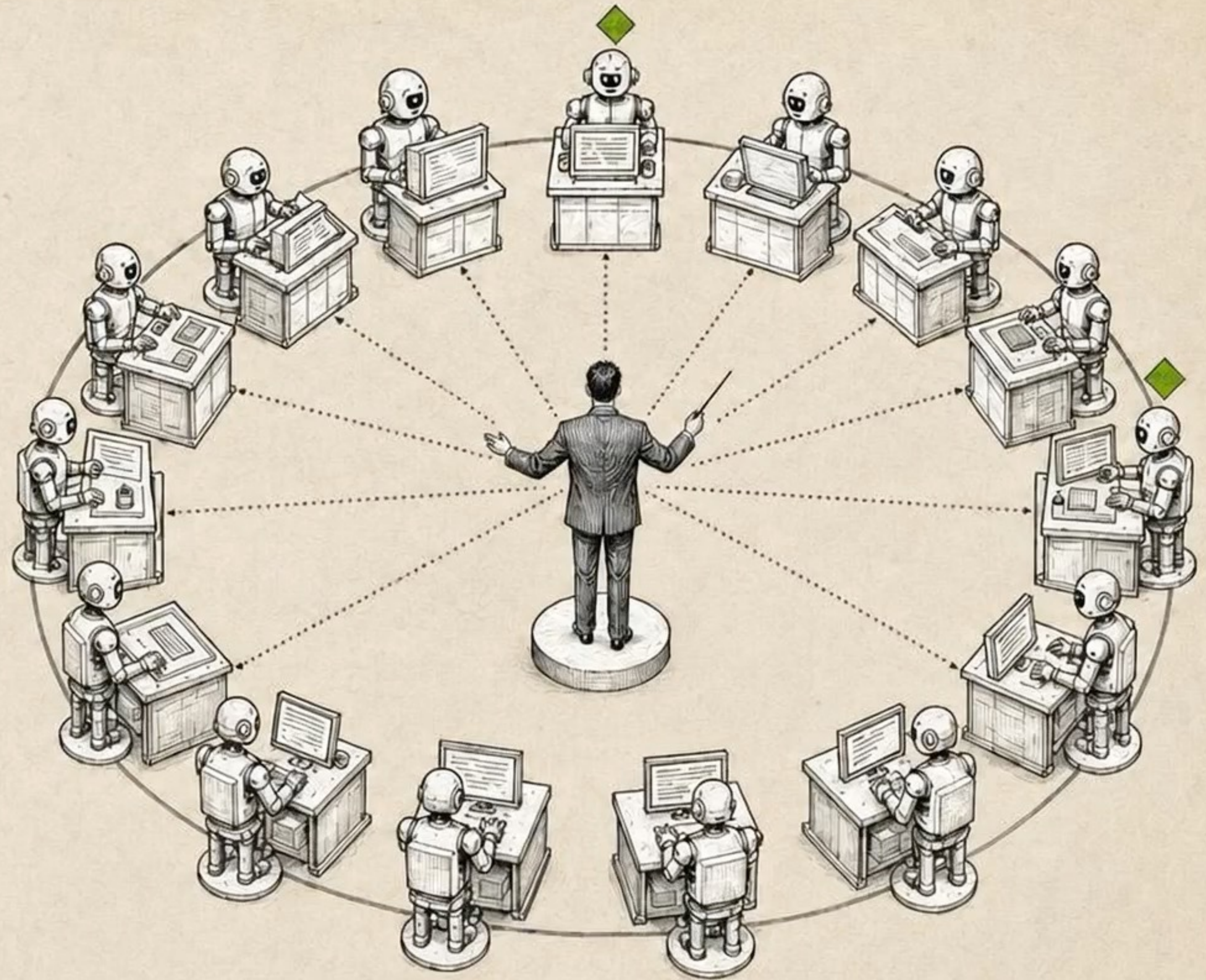


FIG. 2 - Orchestrator topology, single human node.

# My entire setup: a laptop and a DGX Spark

The whole kit fits on a desk.

- DGX Spark hosts the larger AI models locally
- Laptop drives the work — I can sit anywhere
- Laptop talks to the Spark over Wi-Fi — no cables

*No cluster. No data center. Just one researcher.*

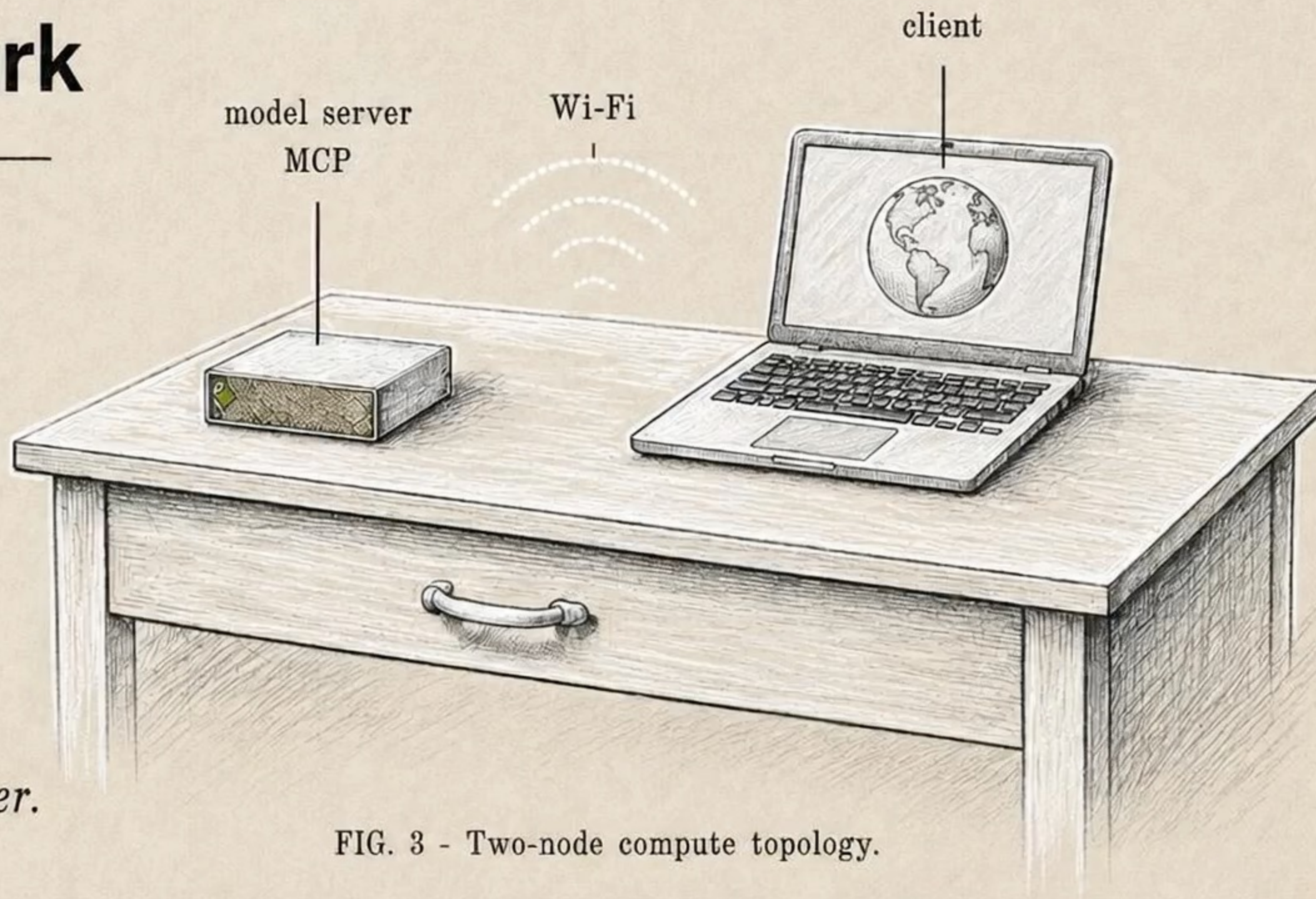


FIG. 3 - Two-node compute topology.



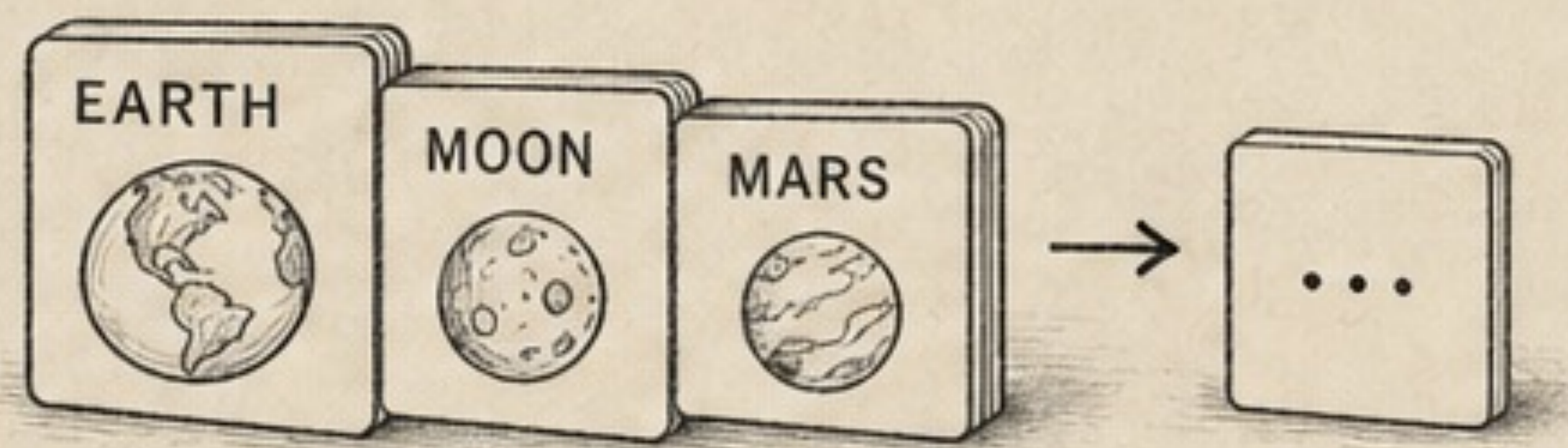
# Design criteria — what I wanted to build

Lightweight web apps that get more powerful when NVIDIA hardware shows up.

✓ **Runs anywhere** —  
in a browser, on any device

✓ **Easy to install, use, and extend**

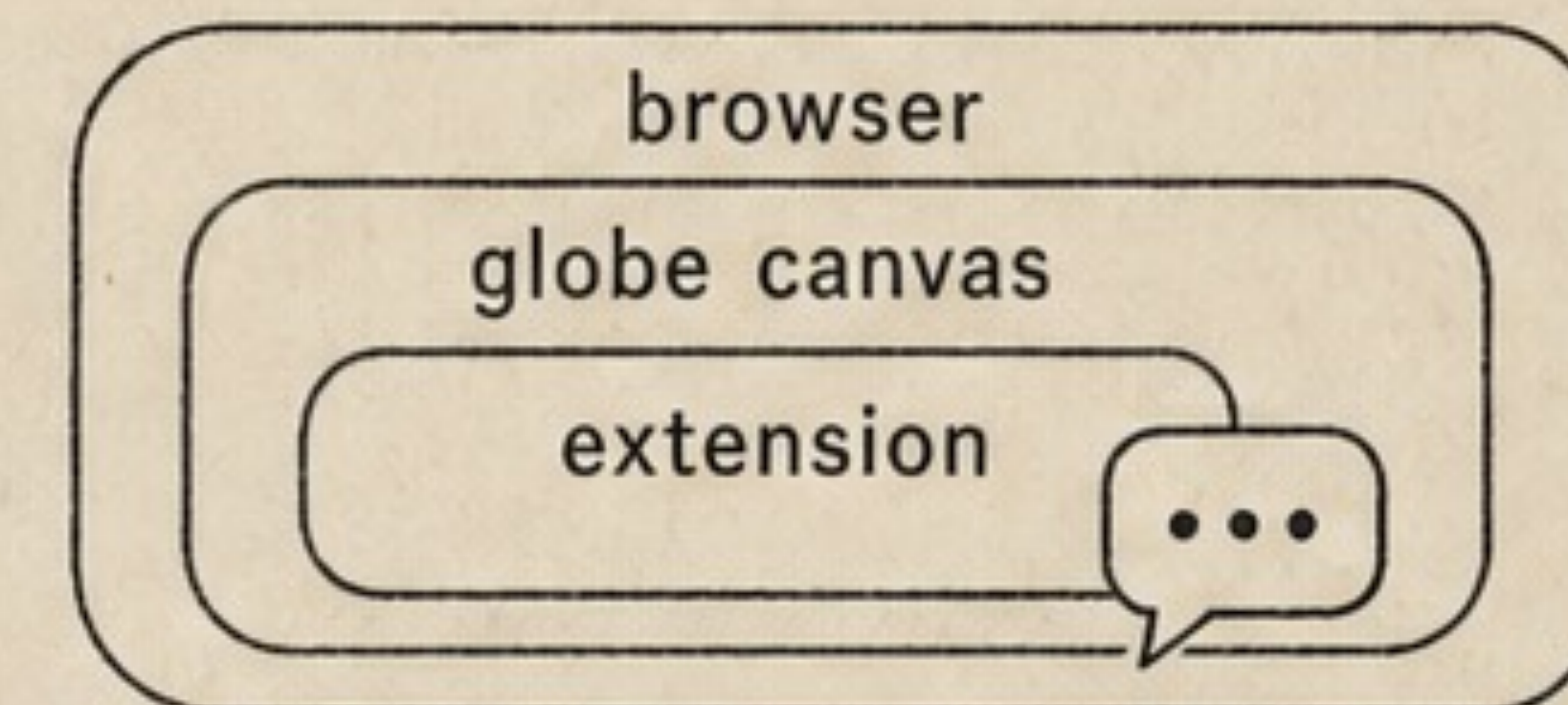
✓ **Modular extensions** —  
the VS Code model



✓ **NVIDIA-accelerated** —  
uses the Spark when present

✓ **Real-time AI** —  
chain models from globe to user

◆ **AI-assistant-first** —  
everything callable from chat



*General enough for weather, climate, Earth observation, heliophysics — and beyond.*

FIG. 4 — Design criteria, the wishlist behind Worldscope.



# Worldscope — a lightweight WebApp for exploring worlds

## One repeatable framework, many worlds.

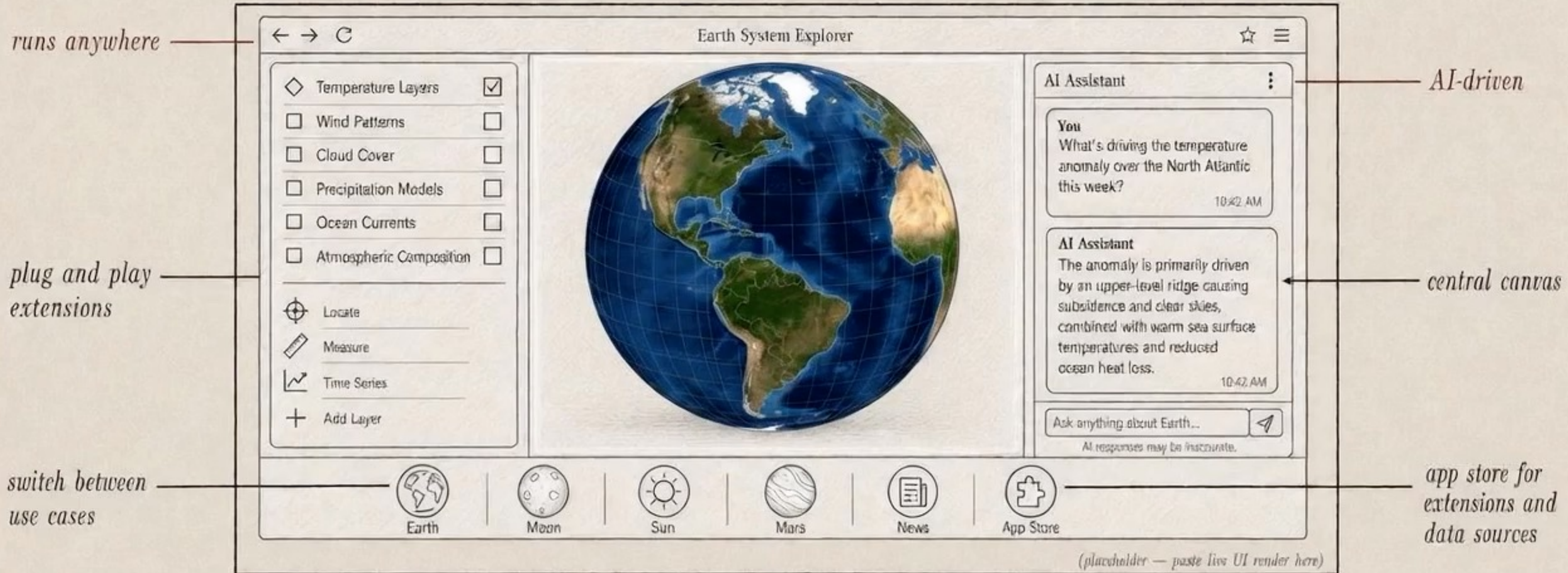


FIG. 5 – Worldscope UI architecture.

■ Runs anywhere, in a browser

■ 3D globe canvas, AI chat panel, plug-in extensions

■ Same engine for Earth, Moon, Sun, Mars

*Let me show you what it actually does.*

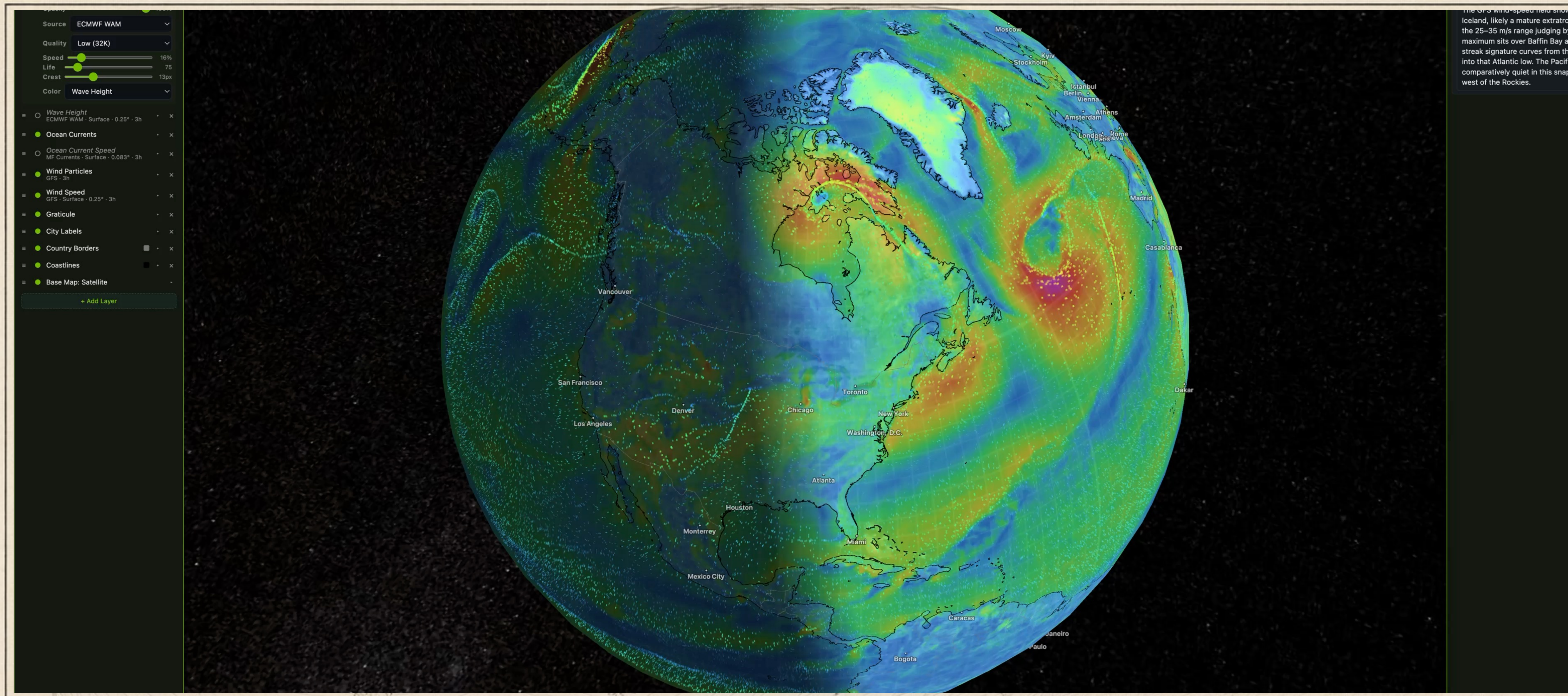


FIG. 6 — Live wind field, surface layer.



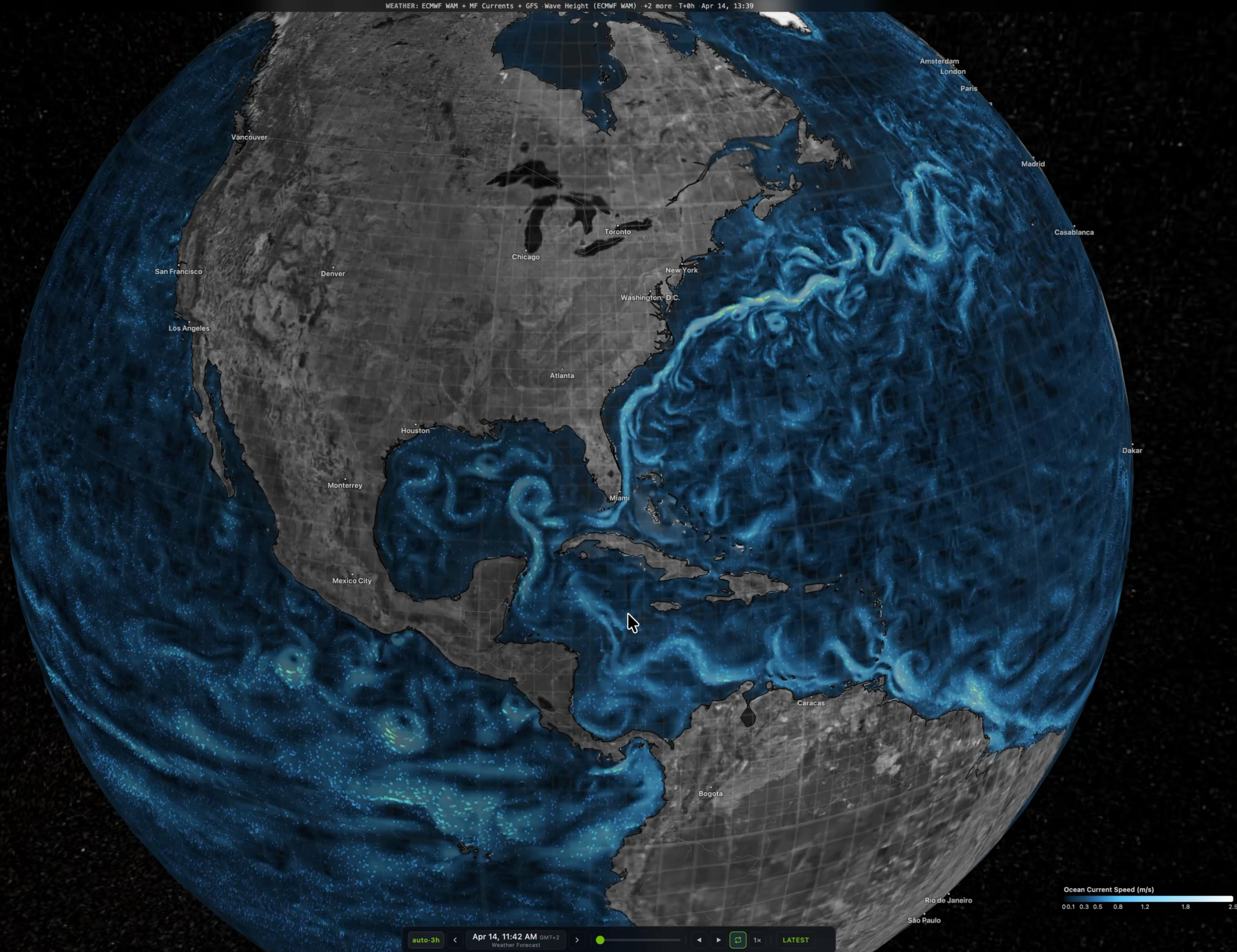
**Earth**

LAYERS SETTINGS

FORECAST TIME **T+0h** Now

- Wave Crests
  - Wave Crests
  - Opacity 100%
  - Source ECMWF WAM
  - Quality Low (32K)
  - Speed 16%
  - Life 75
  - Crest 13px
  - Color Wave Height
- Wave Height
  - ECMWF WAM - Surface - 0.25° - 3h
- Ocean Currents
- Ocean Current Speed
  - MF Currents - Surface - 0.083° - 3h
- Wind Particles
  - GFS - 3h
- Wind Speed
  - GFS - Surface - 0.25° - 3h
- Graticule
- City Labels
- Country Borders
- Coastlines
- Base Map: Satellite

+ Add Layer



Chat

take a look at the globe. describe what is showing in detail. is there anything unusual about the state of the ocean in this view?

Thought process

- Query Screenshot
- Query Screenshot

**The Gulf Stream dominates the view, meandering vividly off the eastern seaboard.**

Details

Ocean Current Speed from Mercator Ocean paints the western North Atlantic in bright filaments: the Loop Current curling through the Gulf of Mexico, the Florida Current threading the Straits, and the Gulf Stream separating near Cape Hatteras into a turbulent, eddy-rich jet that reaches past the Grand Banks. The Caribbean Current runs westward across the basin, and faint equatorial and North Equatorial Counter-Current bands are visible south of the Greater Antilles. Nothing here reads as anomalous without climatology to compare against — but the sheer density of mesoscale eddies shed north of the Gulf Stream is striking, and a well-developed Loop Current intrusion deep into the Gulf is the kind of pattern hurricane forecasters watch closely for rapid-intensification fuel.

Ask Claude or type a command...

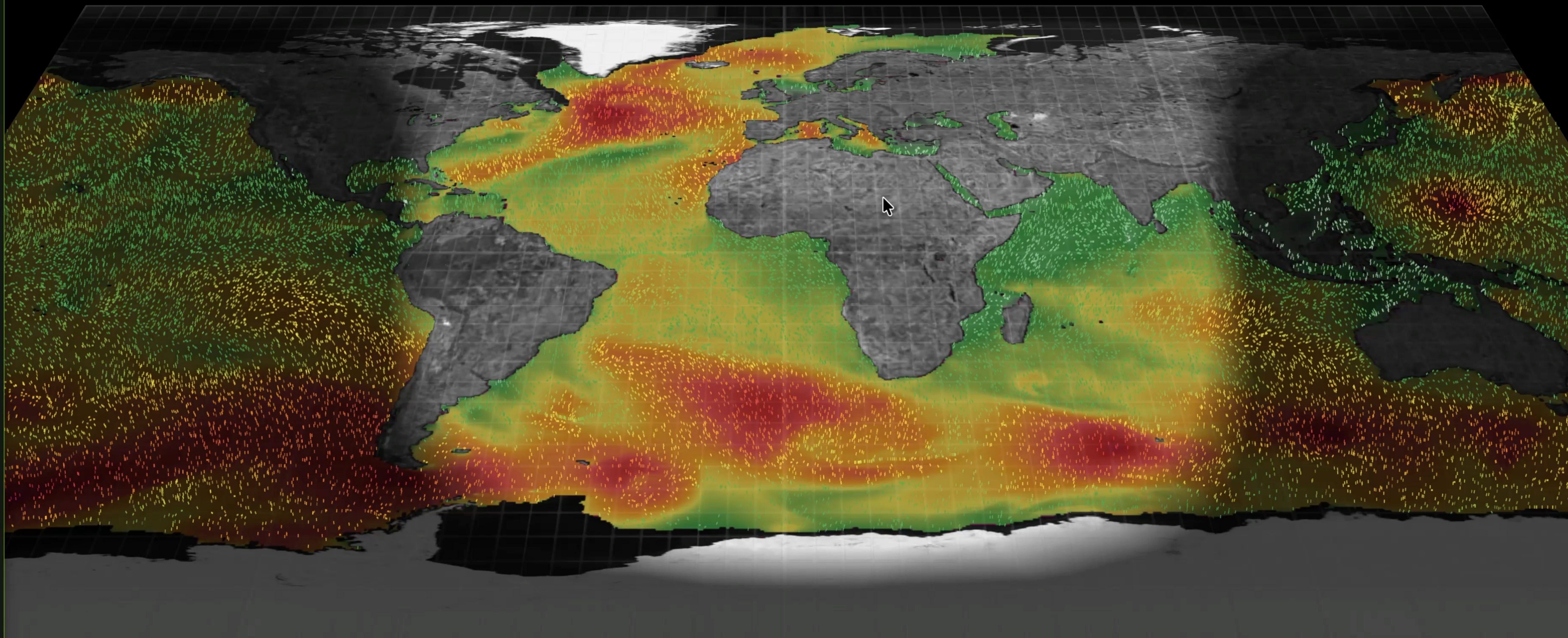
**Earth**

LAYERS SETTINGS

FORECAST TIME **T+0h** Now

- Wave Crests  
Wave Crests  
Opacity 100%  
Source ECMWF WAM  
Quality Low (32K)  
Speed 16%  
Life 75  
Crest 13px  
Color Wave Height
- Wave Height  
ECMWF WAM · Surface · 0.25° · 3h
- Ocean Currents
- Ocean Current Speed  
MF Currents · Surface · 0.083° · 3h
- Wind Particles  
GFS · 3h
- Wind Speed  
GFS · Surface · 0.25° · 3h
- Graticule
- City Labels
- Country Borders
- Coastlines
- Base Map: Satellite

+ Add Layer



auto-3h < Apr 14, 11:42 AM GMT+2 > 1x LATEST

Ask Claude... (c)

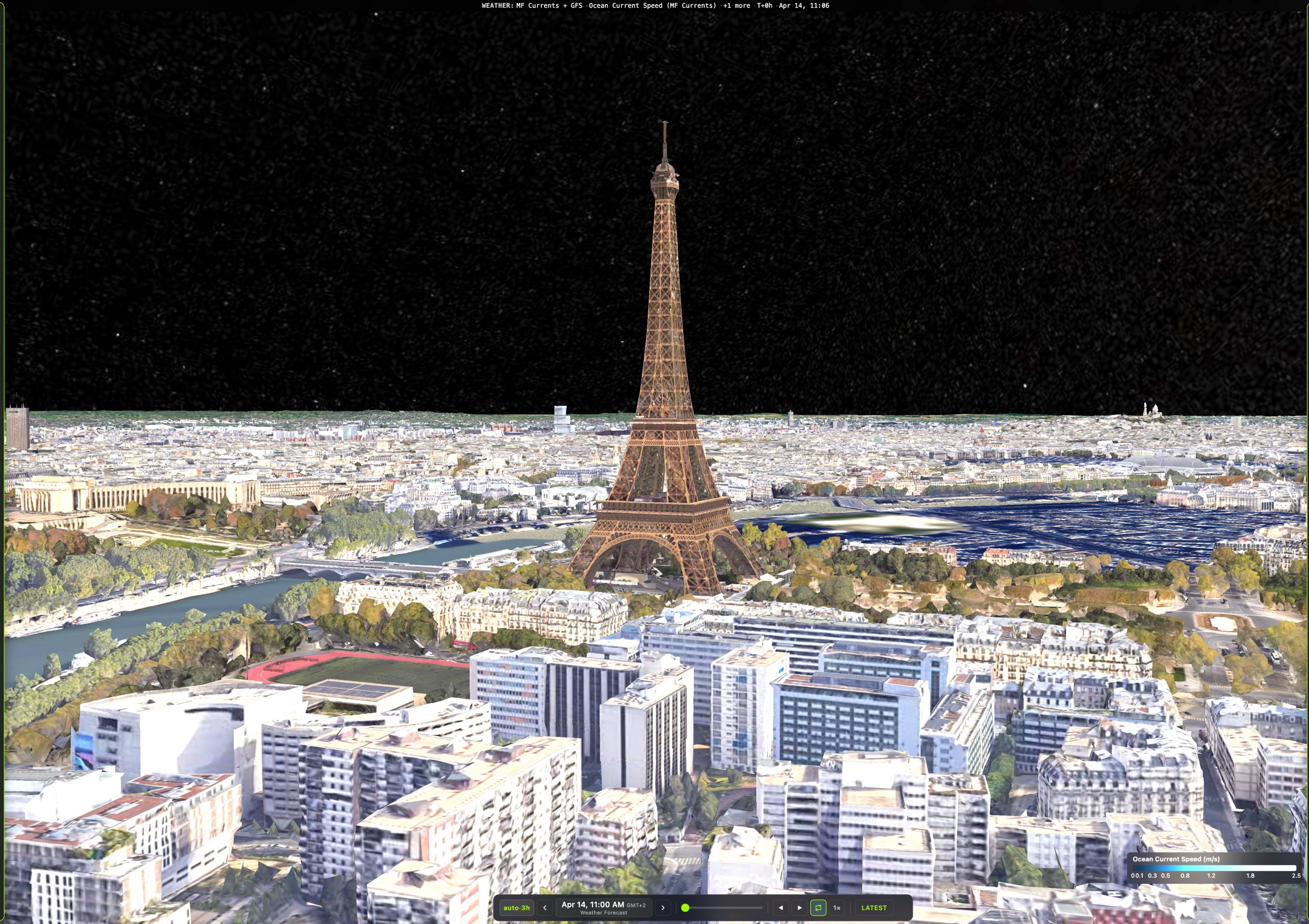
**Earth**

LAYERS SETTINGS

FORECAST TIME **T+0h** Now

- Ocean Currents**
  - Ocean Currents
  - Opacity 100%
  - Quality Ultra (524K)
  - Speed 50%
  - Life 50
  - Width 12px
  - Color Current Speed
- Ocean Current Speed**
  - MF Currents - Surface - 0.083° - 3h
- Wind Particles**
  - GFS - 3h
- Wind Speed**
  - GFS - Surface - 0.25° - 3h
- Graticule**
- City Labels**
- Country Borders**
- Coastlines**
- Base Map: Satellite**

+ Add Layer



auto-3h < Apr 14, 11:00 AM GMT+2 > 1x LATEST

Chat

zoom to the eiffel tower and orbit around it. looking at its middle point from an elevation just above it

Thought process

```
Core Orbit: lat=48.8584, lon=2.2945, distance=400, cameraHeight=200, targetHeight=165, speed=5
```

Orbiting at 400 m, camera 200 m up, aimed at the Eiffel Tower's mid-section (~165 m).

continue orbit

Thought process

```
Core Orbit: lat=48.8584, lon=2.2945, distance=400, cameraHeight=200, targetHeight=165, speed=5
```

— stopped

continue orbit but at a greater distance. maybe twice as far

Thought process

```
Core Orbit: lat=48.8584, lon=2.2945, distance=800, cameraHeight=200, targetHeight=165, speed=5
```

Orbit widened to 800 m from the tower.

Ask Claude or type a command...

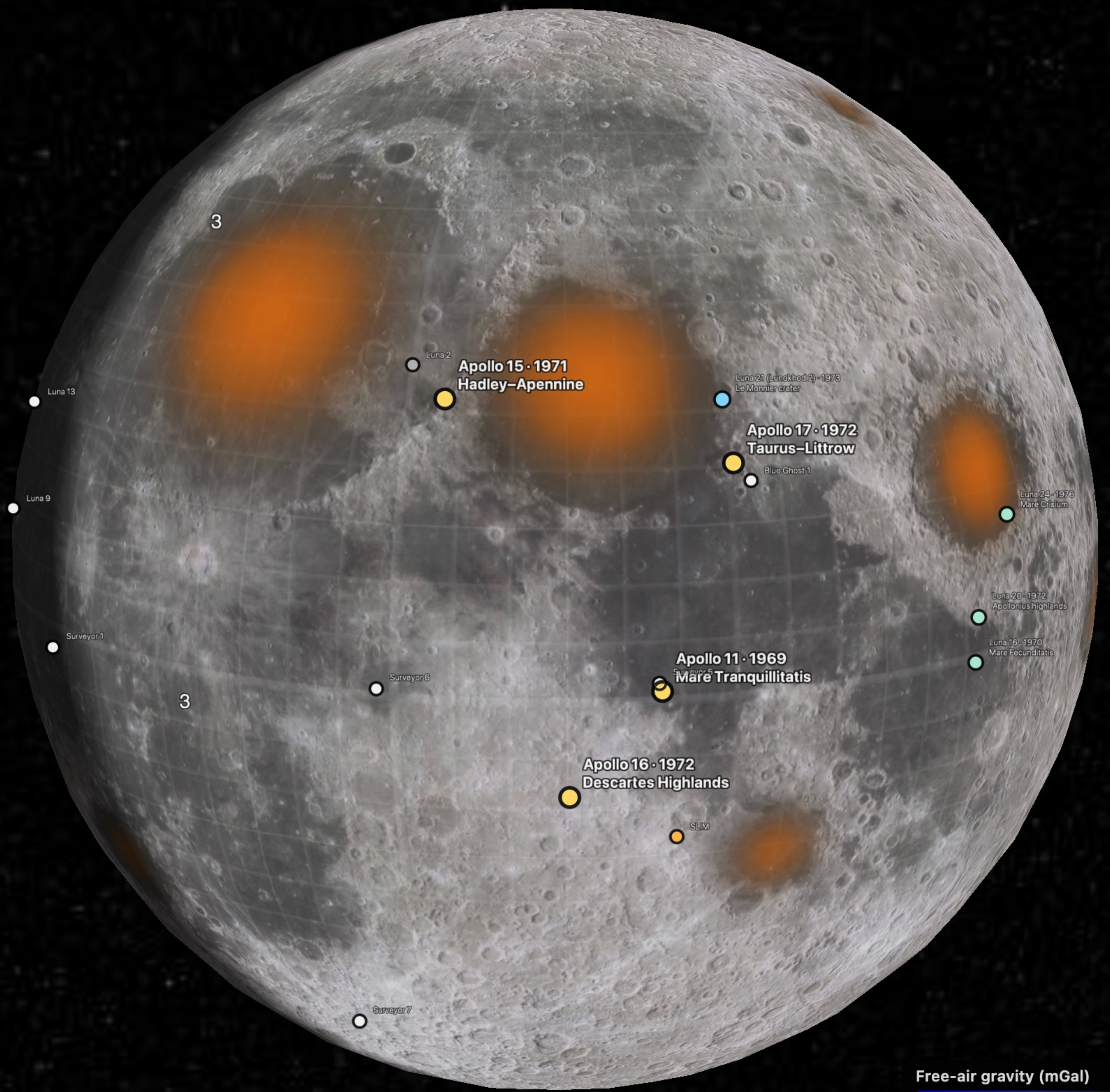
MOON: GRAIL Gravity +2 more · LRO · Apollo · Artemis

**Moon** ✕

**LAYERS** **SETTINGS**

- GRAIL Gravity
- Traverse Tracks
- IAU Named Features
- Artemis III Candidate Regions
- Permanently Shadowed Regions
- Lunar Missions
- Lat/Lon Graticule

[← Return to Earth](#)



**Chat** ✕

what is GRAIL Gravity showing here?  
10:49:17

[Take screenshot](#)

**GRAIL Gravity shows lunar gravitational field variations from NASA's twin spacecraft mission\*\*\*\*GRAIL Gravity reveals massive buried structures as orange positive gravity anomalies beneath mare basins.**

**Details**

The orange patches show regions where lunar gravity is stronger than average, indicating dense subsurface material. These positive gravity anomalies correspond to mascons (mass concentrations) — dense basaltic lava flows and uplifted mantle material beneath the dark mare plains. The largest anomalies align with Mare Imbrium (upper left), Mare Serenitatis (upper right), and Mare Crisium (far right). GRAIL's twin spacecraft measured these variations with unprecedented precision, revealing how asteroid impacts excavated deep craters that later filled with heavy volcanic material, creating the gravitational signatures we see overlaid on the lunar surface.

first 2.6s · tools 1.8s · total 9.8s · tts start 2.5s · tts 3.2s...

\$0.107 this session (3 req) | \$8.69 lifetime

[Ask Claude or type a command...](#) ⚙️

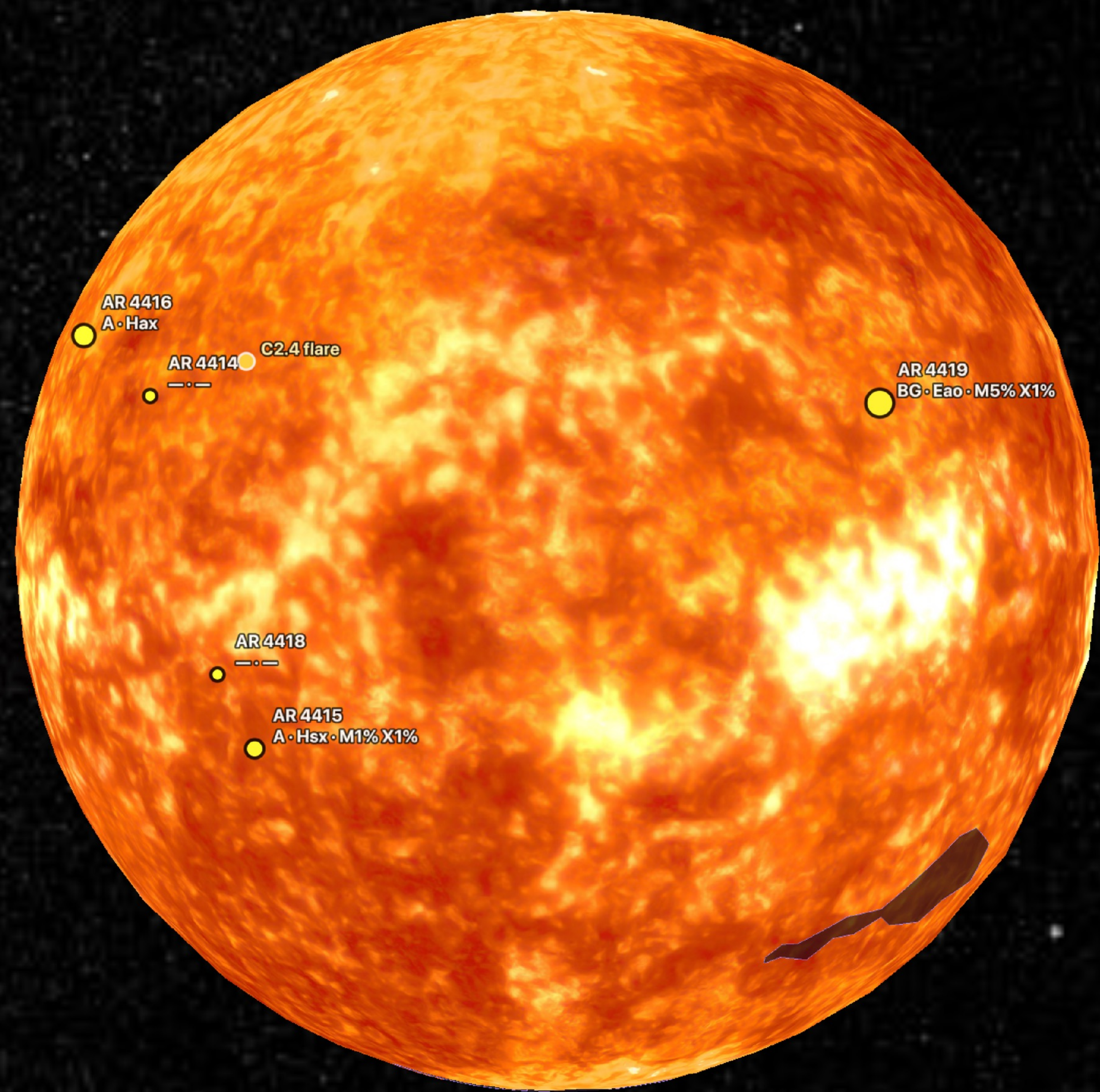
SUN: Flares (NASA DONKI · 14d) +2 more · NASA/SDO + NOAA SWPC

**Sun** [Close]

**LAYERS** SETTINGS

- Flares (NASA DONKI) [On]
- Coronal Holes (HEK/SPoCA · 7d) [Off]
- Filaments (HEK · 14d) [Off]
- Active Regions (NOAA SWPC) [On]
- HMI Magnetogram (line-of-sight B)
- HMI Continuum (visible surface)
- AIA 131 Å (flares)
- AIA 335 Å (active-region hot plasma)
- AIA 304 Å (chromosphere)
- AIA 211 Å (coronal holes)
- AIA 193 Å (active regions)
- AIA 171 Å (coronal loops)
- Lat/Lon Graticule

[← Return to Earth](#)



**Chat** [Close]

**TRY ASKING**

Show live cargo ships in the Red Sea and Gulf of Aden with wind and currents. Where are vessels clustering or diverting around the Bab-el-Mandeb chokepoint?

[Use this prompt →](#)

**Moon** — Moon active. 29 mission sites visible. Try "show me Shackleton" or toggle Artemis candidate regions.

**Sun** — Sun globe active. 5 active regions observed 2026-04-19 (NOAA SWPC). Toggle an SDO band to see live disc imagery.

what's a coronal hole?  
08:54:27

[Switch globe](#)

**Coronal holes are cool, low-density regions in the Sun's corona that appear dark in X-ray images.\*\*\*\*Coronal holes are dark regions on the Sun where magnetic field lines extend into space.**

▼ Details

A coronal hole appears as a dark area in extreme ultraviolet images because the plasma density there is much lower than in surrounding regions. Unlike closed magnetic loops that trap hot plasma, coronal holes have open magnetic field lines that allow solar wind to escape at high speeds (up to 800 km/s). These fast streams create geomagnetic disturbances when they reach Earth 2-4 days later, potentially triggering auroras at lower latitudes.

\$0.111 this session (3 req) | \$11.60 lifetime

[Settings]

WEATHER: Wind Speed (km/h) · Surface · T+0h · Apr 19, 09:17



Ask Claude... (c)

### SFNO (FourCastNet V2) (2.6GB)

Ready 0.25° · 6h step [unload](#)  
Using 2.6 GB VRAM — 84 GB free of 120 GB

#### MODEL PARAMETERS

Source: **GFS** (v)  
NOAA GFS (0.25° operational)

IC Cycle: **Latest** (v)

Steps (48h): **8**

Device: **cuda** (v)

Ensemble Members: **1**

IC Perturbation: **0.5**

Ensemble Size: **0**

#### COMPUTE RESOURCE

NVIDIA GB10  
Mem: 35.3/120GB  
Free: 84.4 GB  
Temperature: 40°C  
Utilization: 5%  
Driver: 590.48.01

### SFNO (FOURCASTNET V2) VARIABLES 34/73

Select All Reset

U WIND	V WIND	TEMPERATURE	GEOPOTENTIAL	HUMIDITY	
u50	v50	t50	z50	q50	+
u100	v100	t100	z100	q100	+
u150	v150	t150	z150	q150	+
u200	v200	t200	z200	q200	+
u250	v250	t250	z250	q250	+
u300	v300	t300	z300	q300	+
u400	v400	t400	z400	q400	+
u500	v500	t500	z500	q500	+
u600	v600	t600	z600	q600	+
u700	v700	t700	z700	q700	+
u850	v850	t850	z850	q850	+
u925	v925	t925	z925	q925	+
u1000	v1000	t1000	z1000	q1000	+
none	none	all	all	all	

#### SURFACE 8/8

u10m v10m u100m v100m t2m sp msl tcwv none

SFNO (FourCastNet V2) · GFS IC · 8 steps (48h) · 34 variables

NVIDIA GB10 84.4 GB free / 120 GB

Run Forecast — 34 vars, 48h

localhost:5173

NVIDIA Links Morning standup NV Notes All Bookmarks

EARTH: LAYERS SETTINGS WIND CURRENTS WAVES TRUE COLOR LIGHTS SST AUTOPILOT

WEATHER: GFS Wind Speed (GFS) · T+0h · Apr 19, 09:39

Wind Speed (km/h)

0 15 30 45 60 75 90 110 130

Apr 19, 9:38 AM GMT+2 Weather Forecast

Ask Claude... (c)

localhost:5173/src/analysis/index.html

### Worldscope Analysis CONNECTED

5 probes

PROBES

- 26.6N, 149.5E** 26.59, 149.48 · 7 vars
- 28.5N, 154.9E** 28.49, 154.91 · 7 vars
- 31.2N, 160.5E** 31.24, 160.47 · 7 vars
- 56.2N, 179.2E** 56.20, 179.23 · 7 vars
- 52.9N, 171.0W** 52.89, -170.95 · 7 vars

RUNS

No forecast runs yet

S M L

**26.6N, 149.5E** 26.59N, 149.48E

Temperature (2m) 2 Wind Speed (10m) 2 Wind Gusts (10m) 2 Pressure (MSL) 2 Humidity (2m) 2 Cloud Cover 2 Precipitation 2

— GFS — ECMWF IFS

**28.5N, 154.9E** 28.49N, 154.91E

Temperature (2m) 2 Wind Speed (10m) 2 Wind Gusts (10m) 2 Pressure (MSL) 2 Humidity (2m) 2 Cloud Cover 2 Precipitation 2

— GFS — ECMWF IFS

**31.2N, 160.5E** 31.24N, 160.47E

Temperature (2m) 2 Wind Speed (10m) 2 Wind Gusts (10m) 2 Pressure (MSL) 2 Humidity (2m) 2 Cloud Cover 2 Precipitation 2

— GFS — ECMWF IFS

**56.2N, 179.2E** 56.20N, 179.23E

Temperature (2m) 2 Wind Speed (10m) 2 Wind Gusts (10m) 2 Pressure (MSL) 2 Humidity (2m) 2 Cloud Cover 2 Precipitation 2

— GFS — ECMWF IFS

# Worldscope News – an AI-curated newspaper

A newspaper-style feed, summarized in real time.

- Aggregates RSS, YouTube, HN, X, Bing
- Haiku summarizes; Sonnet cross-analyzes
- Listen mode: the whole edition, aloud

*Same framework.  
Now it reads the news for you.*

The screenshot displays the WorldScope News interface. At the top, it shows the date 'TUESDAY, APRIL 28, 2026' and 'EDITION FOR YOU'. The main navigation includes 'TOP TOPICS' (AI, Robotics, Science, AI Weather) and 'SOURCES' (Google News, YouTube, Hacker News, Ars Technica, Bing News, X). A 'TODAY'S BRIEFING' section offers to 'Listen to all 772 stories · 1263 min'. The main feed is divided into two columns. The left column features a story from CXO DIGITALPULSE titled 'US robotics software startup Sereact raises \$110 million to scale AI-powered automation', with a sub-headline: 'Sereact has secured \$110 million to deploy AI-powered robotic automation at scale, marking a critical inflection point where software-driven robotics transitions from niche applications to mainstream industrial adoption.' The right column features a story from 디지털투데이 titled 'Quantum computing investment divide widens as Wall Street bets and banks hesitate', with a sub-headline: 'Wall Street's quantum bet is fracturing along a fault line: venture capital and Big Tech are doubling down while banks and established financial firms are quietly retreating, signaling deep skepticism about near-term commercial viability.' Below these are two more article teasers: 'Meta, Google, OpenAI among Big Tech firms seeing top staff leaving to launch AI startups' and 'Former Google DeepMind researcher's AI startup raises record \$1.1 billion seed funding to pursue superintelligence'.

FIG. 12 — News digest, two-page spread.



# Any AI assistant can drive Worldscope

Every function exposed as an MCP tool.

- Claude Code, Cursor, ChatGPT, Ollama
- Autopilot mode — two AI personas
- Optional text-to-speech, distinct voices

*A self-running demo, on demand.*

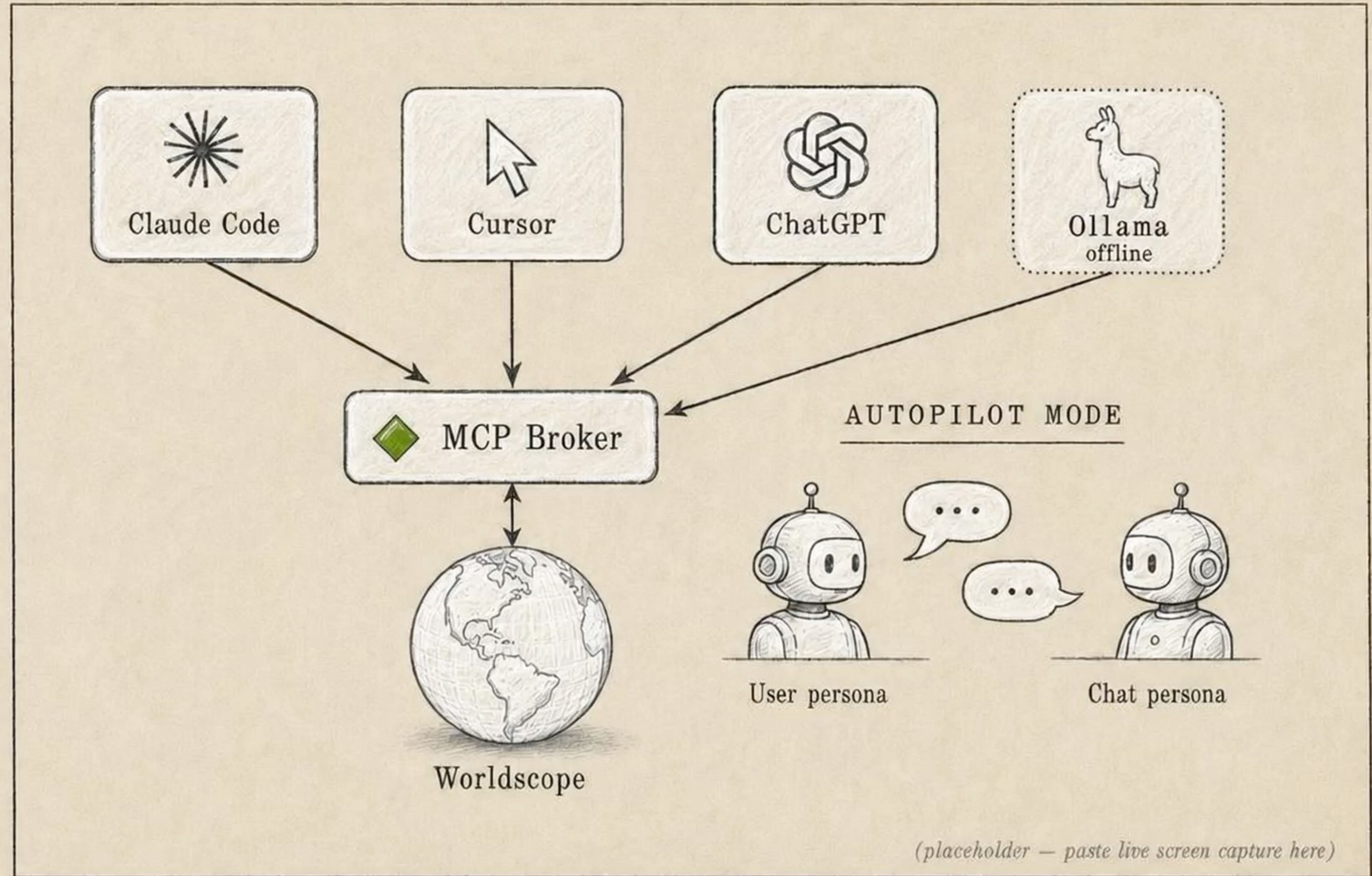


FIG. 13 — Client-protocol-application topology.

# How: Claude Code, MCP, and a few weeks each

Code development is nearly instant now.

- Claude Code CLI on max effort, top-tier subscription
- MCP wired in — agent runs code, screenshots, iterates without me hovering
- Each Worldscope app: about a week.  
Major features: 1–2 days.

*Opus 4.7, Claude Design, Seedance Pro 2.0 — all dropped while I was building this talk.*

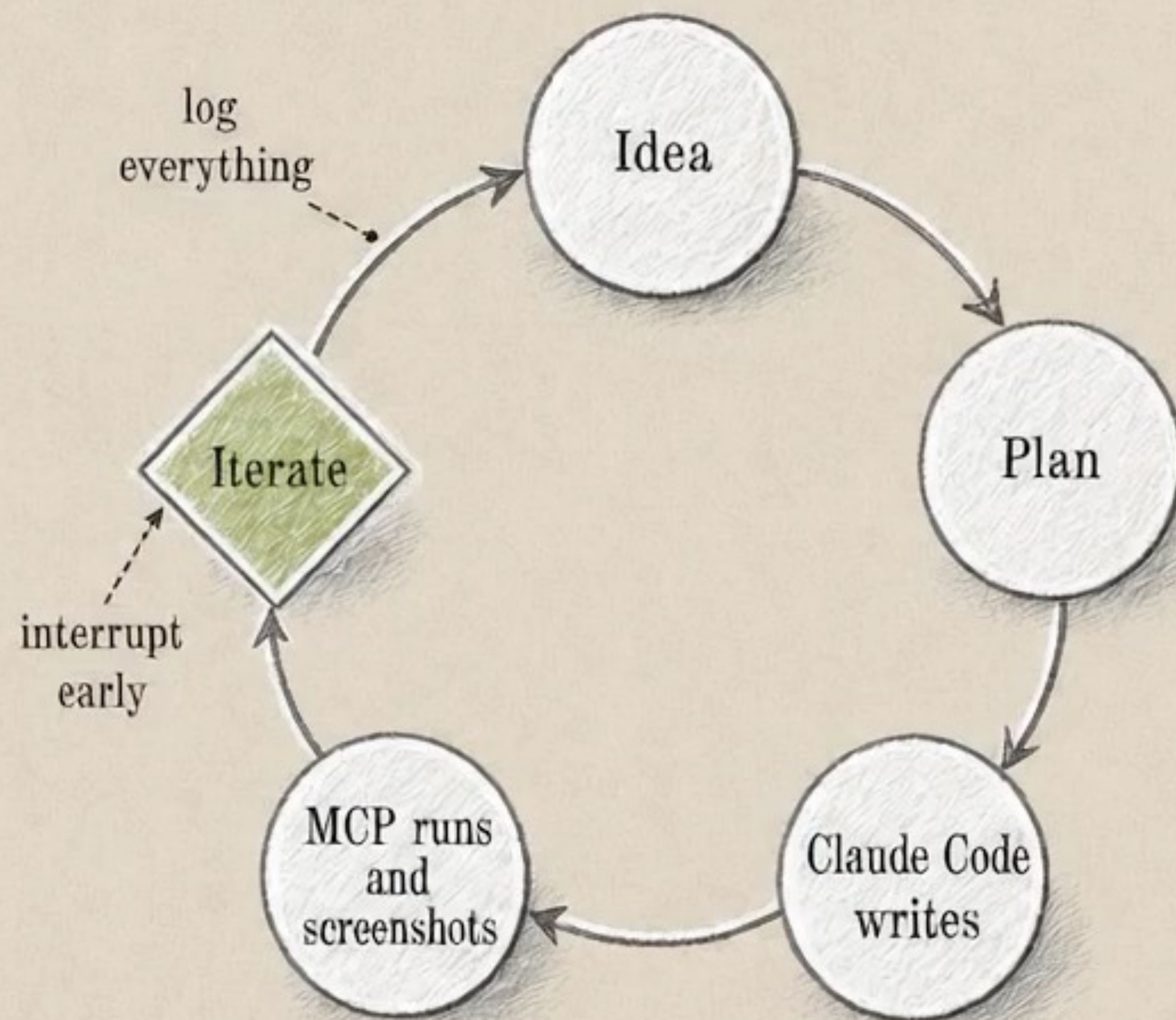


FIG. 14 - Development loop, single human-in-the-loop.



# What this means – and what to try next

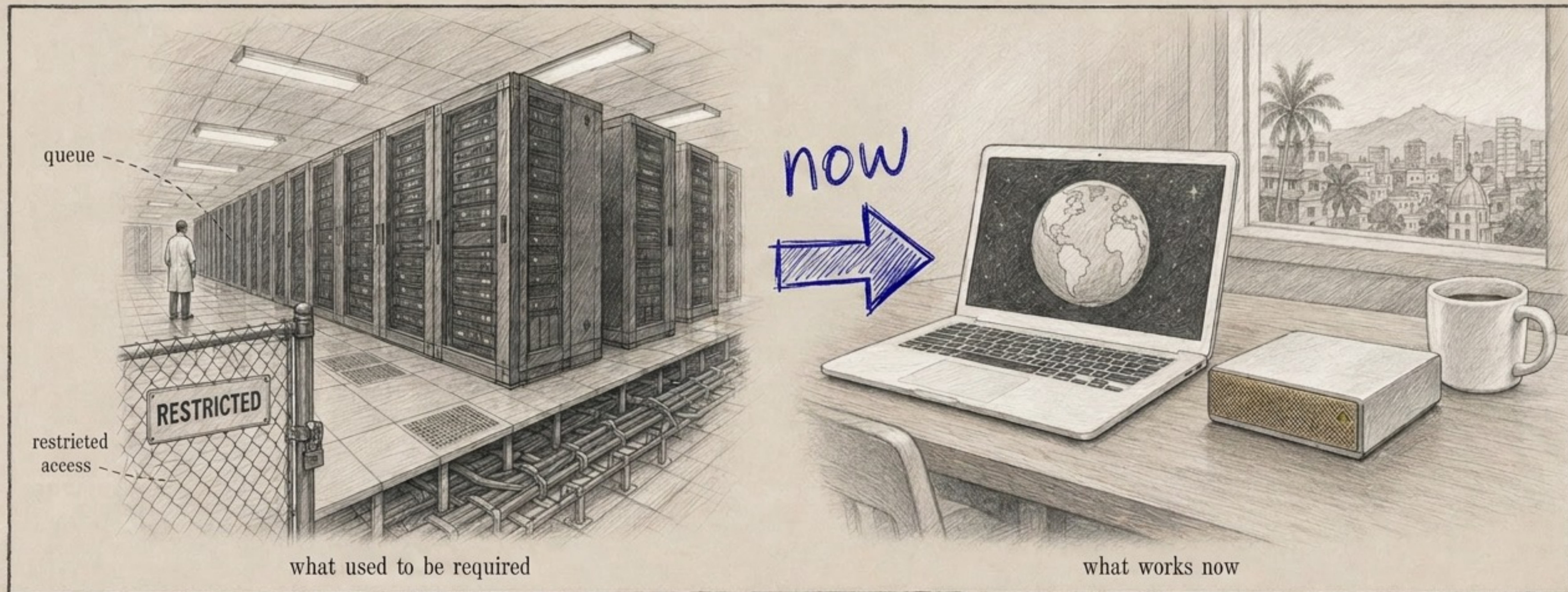


FIG. 15 – Compute access, before and after.



# Thanks for your attention.

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*Questions welcome – and happy to chat more after the talk.*

dhall@nvidia.com

NVIDIA Earth-2

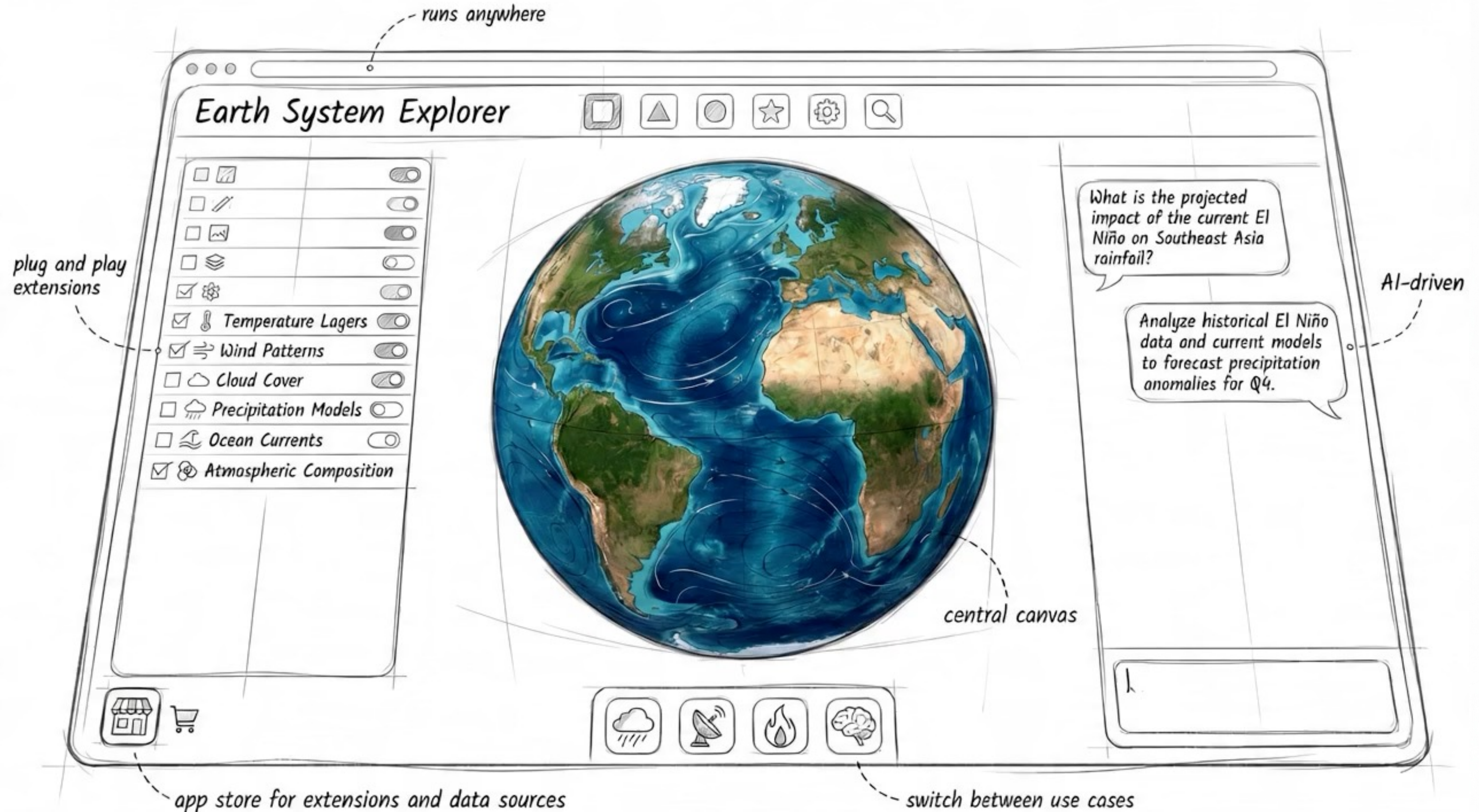
*repo not yet public – email to be notified*



FIG. 16 - End of run.

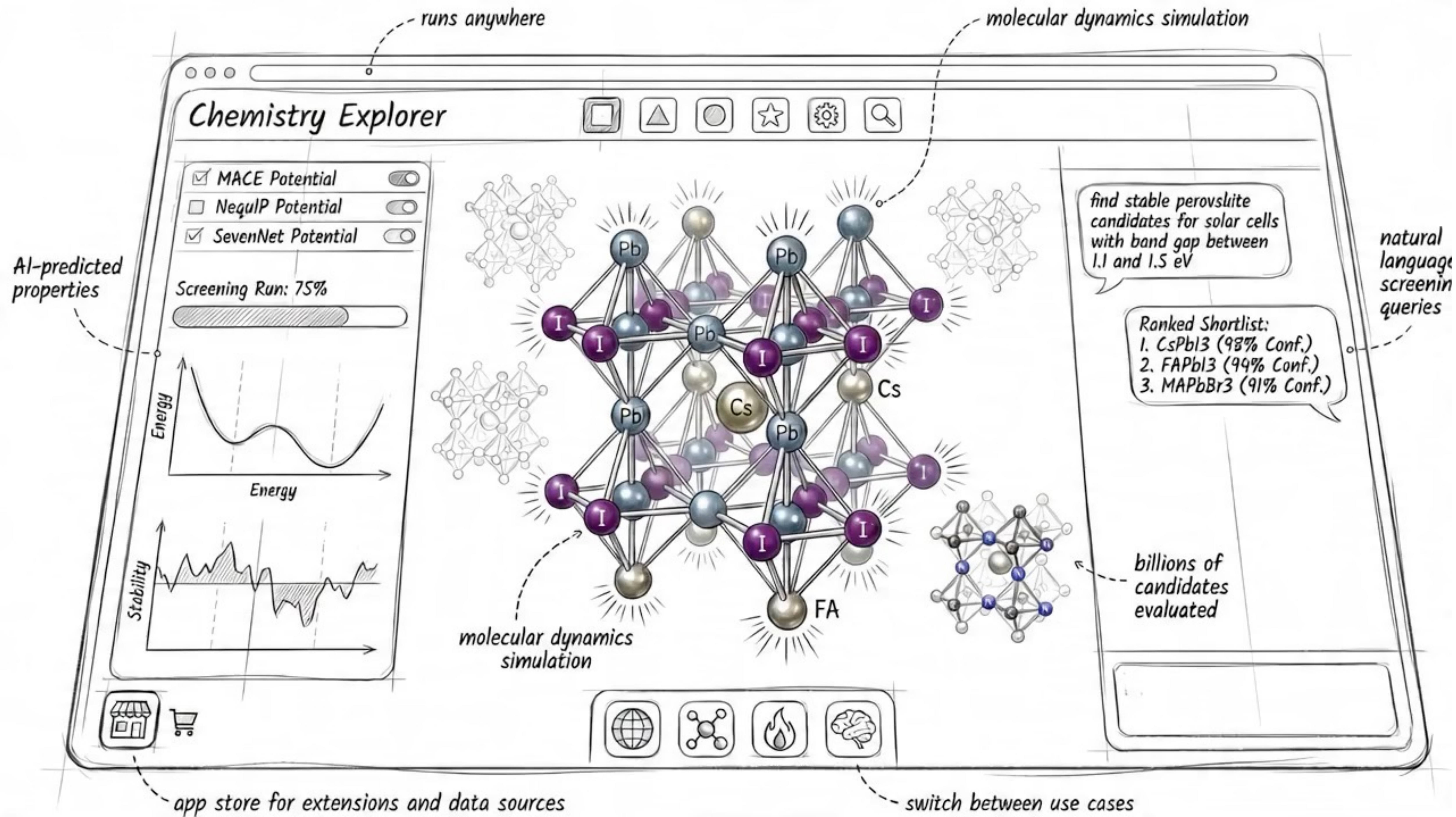


# Earth-System Explorer

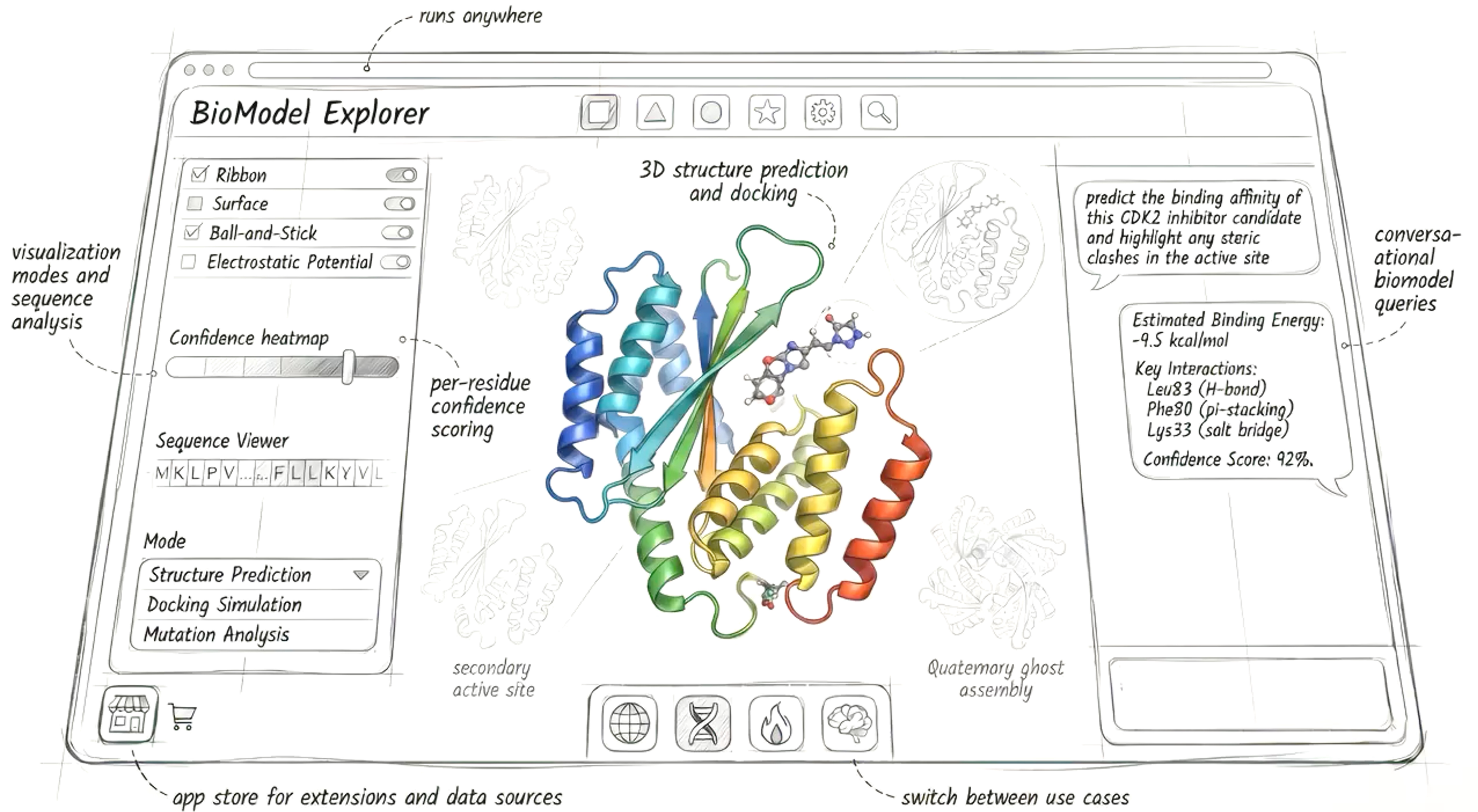




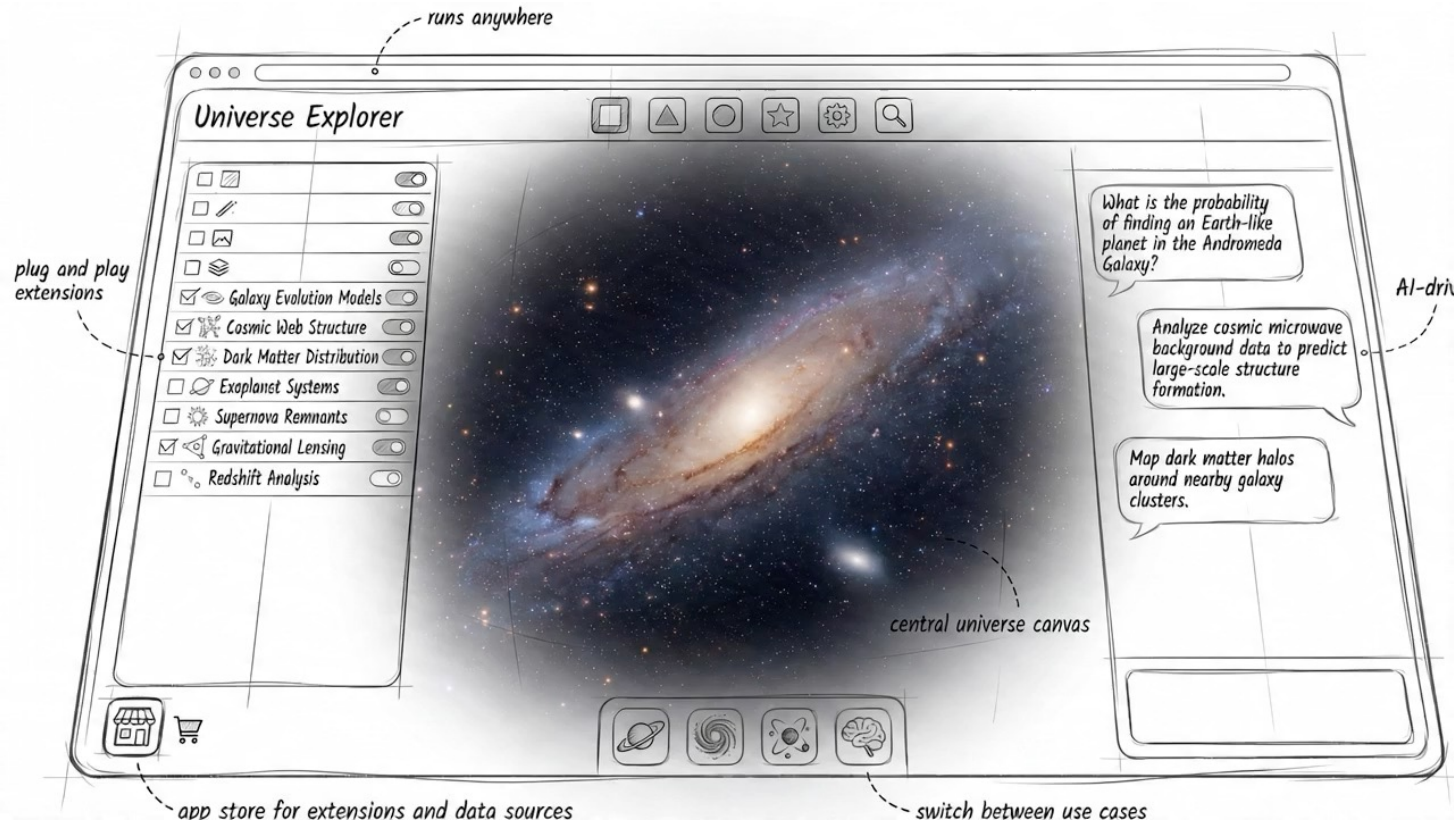
# Chemistry Explorer



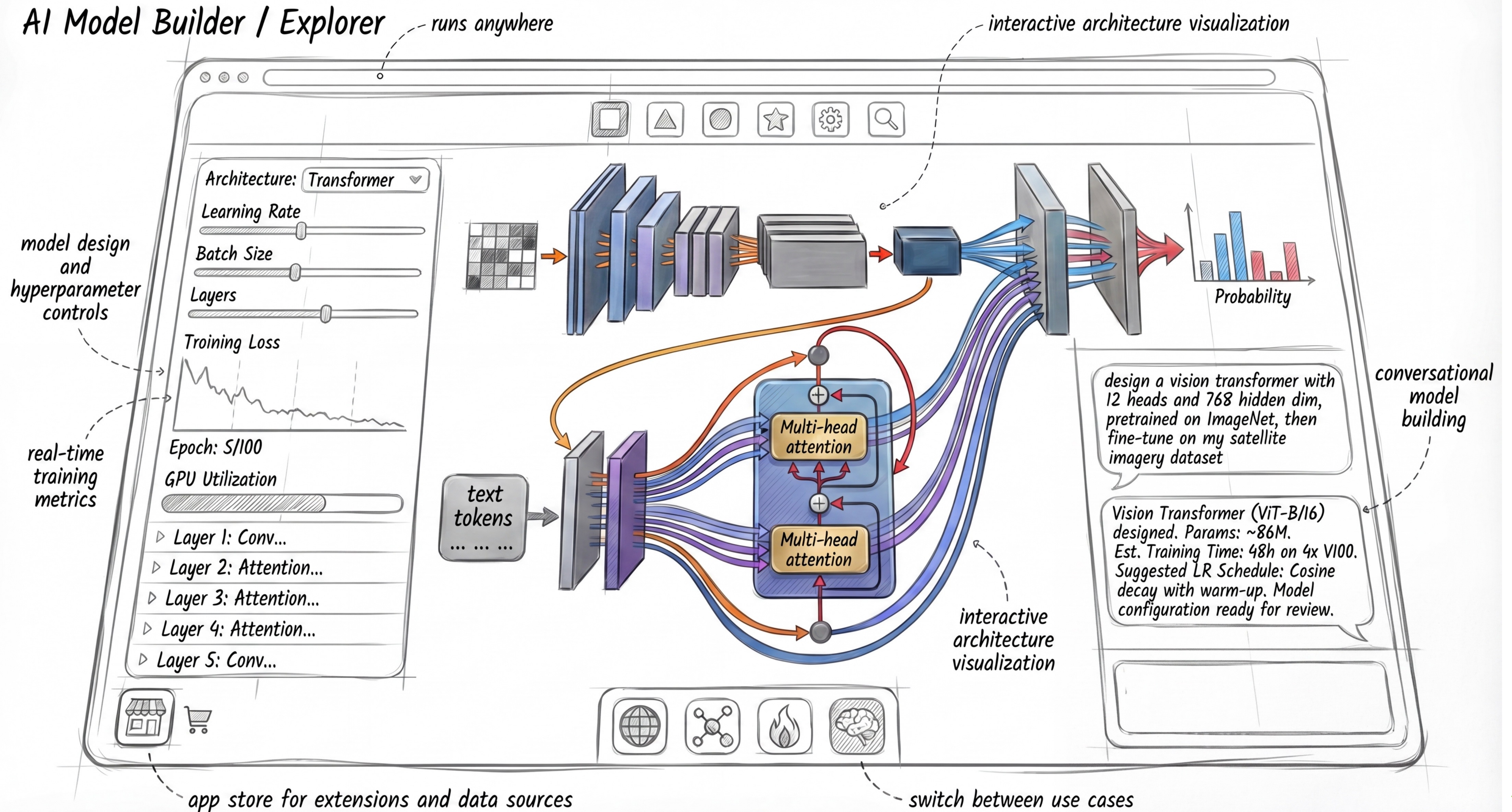
# Bio-Model Explorer



# Universe Explorer – Astronomy, Astrophysics, Exo-planets etc

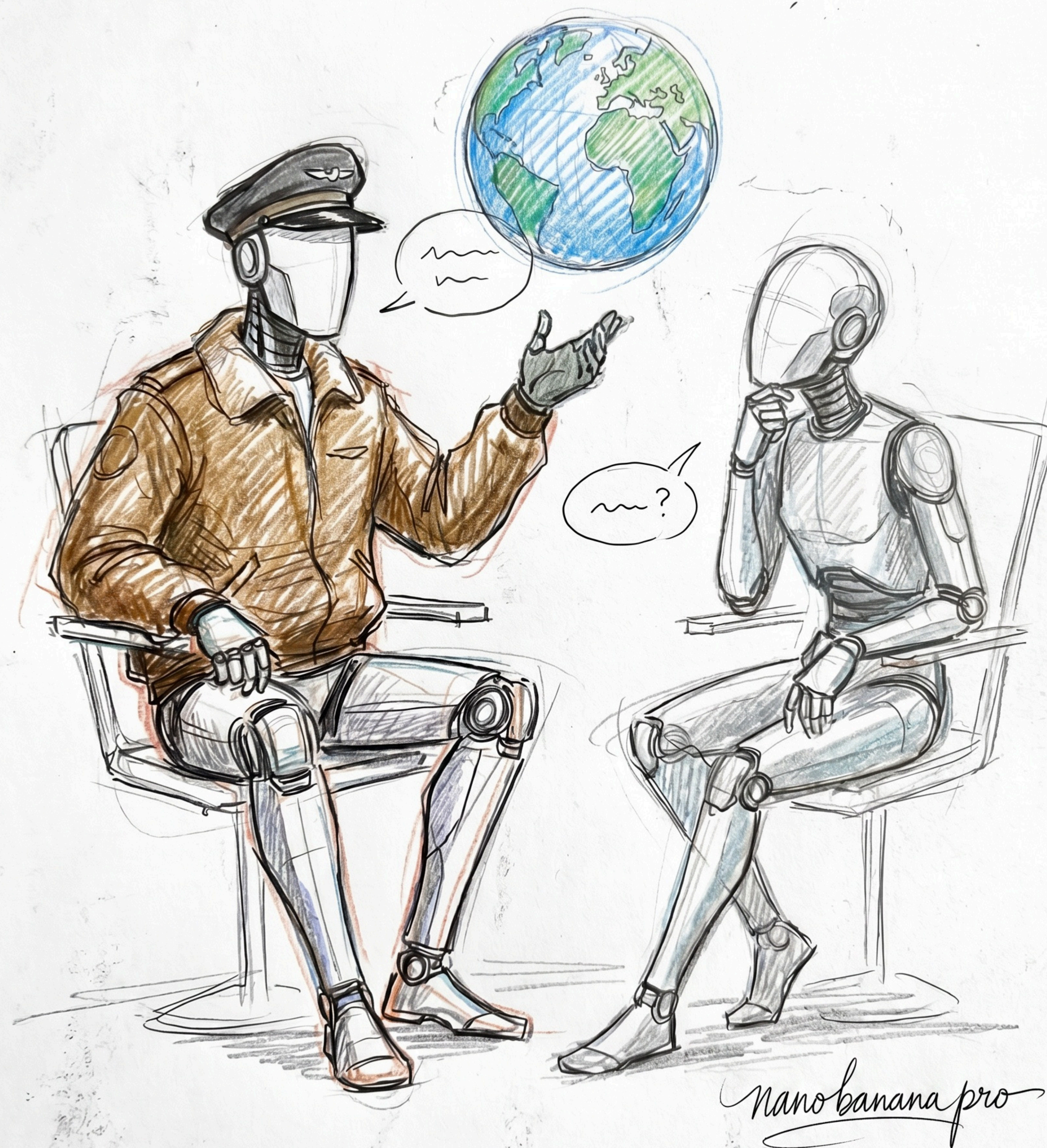


# AI-Model Builder and Explorer



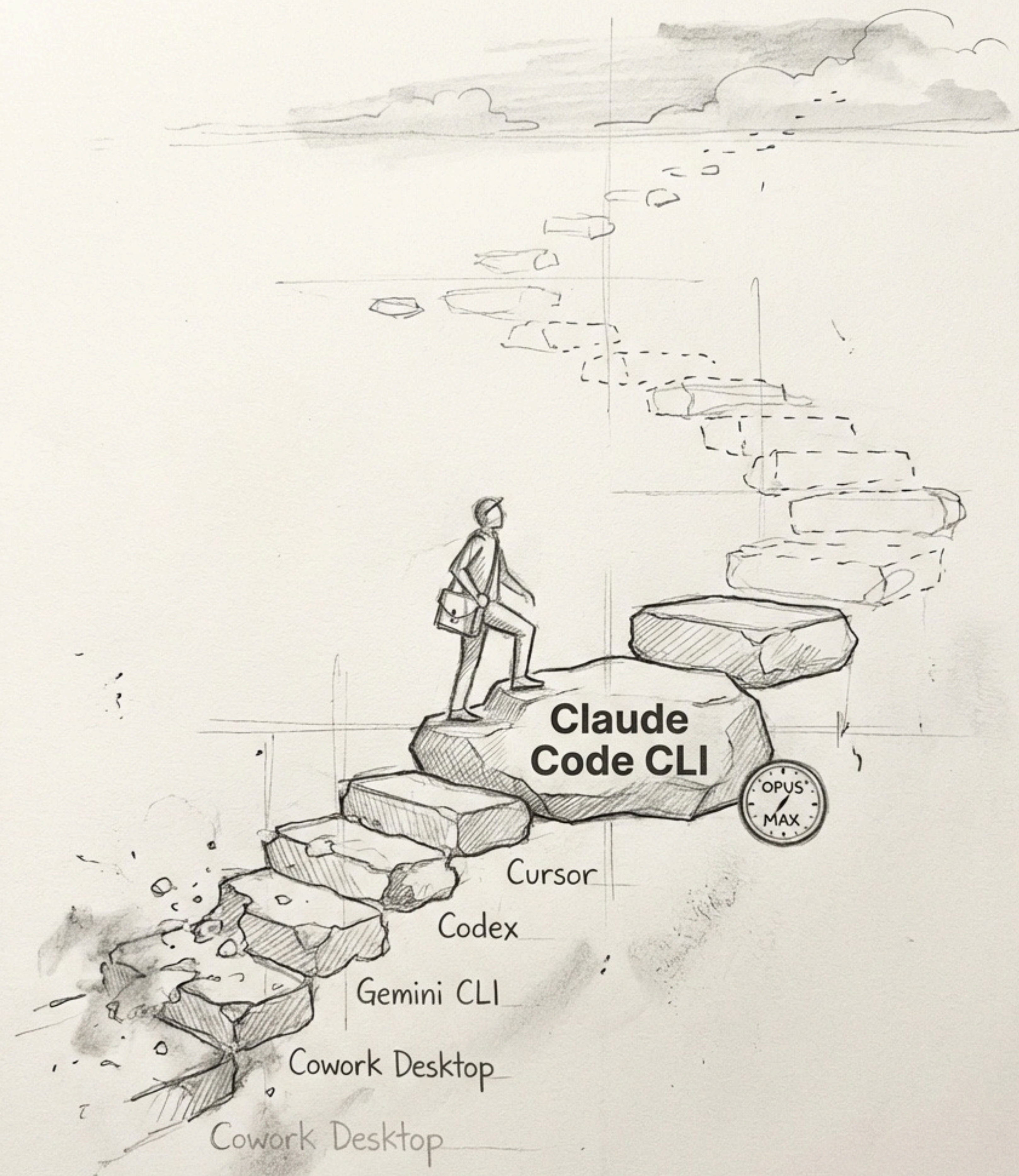
# MCP Control and Autopilot mode

- **Built-in chat panel.** Control the globe using various back-end LLMs.
- **Drive it from anywhere.** Claude Code, Claude Desktop, Cursor. All via MCP.
- **Offline mode.** Swap in local LLMs via Ollama or other services.
- **Autopilot demo mode.** Two AI personas chat with each other autonomously.
- **Scientist Q&A loop.** User persona asks questions, chat persona explores data and answers, then follow-ups continue naturally.
- **Voice output.** Optional TTS for both personas with different voices.



## Claude is my Tool of Choice (recently)

- **Claude Code CLI wins (for now).** Most productive tool I've found.
- **CLIs beat IDEs.** Used Cursor for a while, but CLIs are more powerful and flexible.
- **Tried the alternatives.** Codex, Gemini CLI, Cowork Desktop. Claude Code's feedback loop felt sharper.
- **Max effort, max model.** Always Claude Opus, /effort high or max, top-tier subscription.
- **Re-evaluate constantly.** Things change fast. Make sure you're on the best available tools.

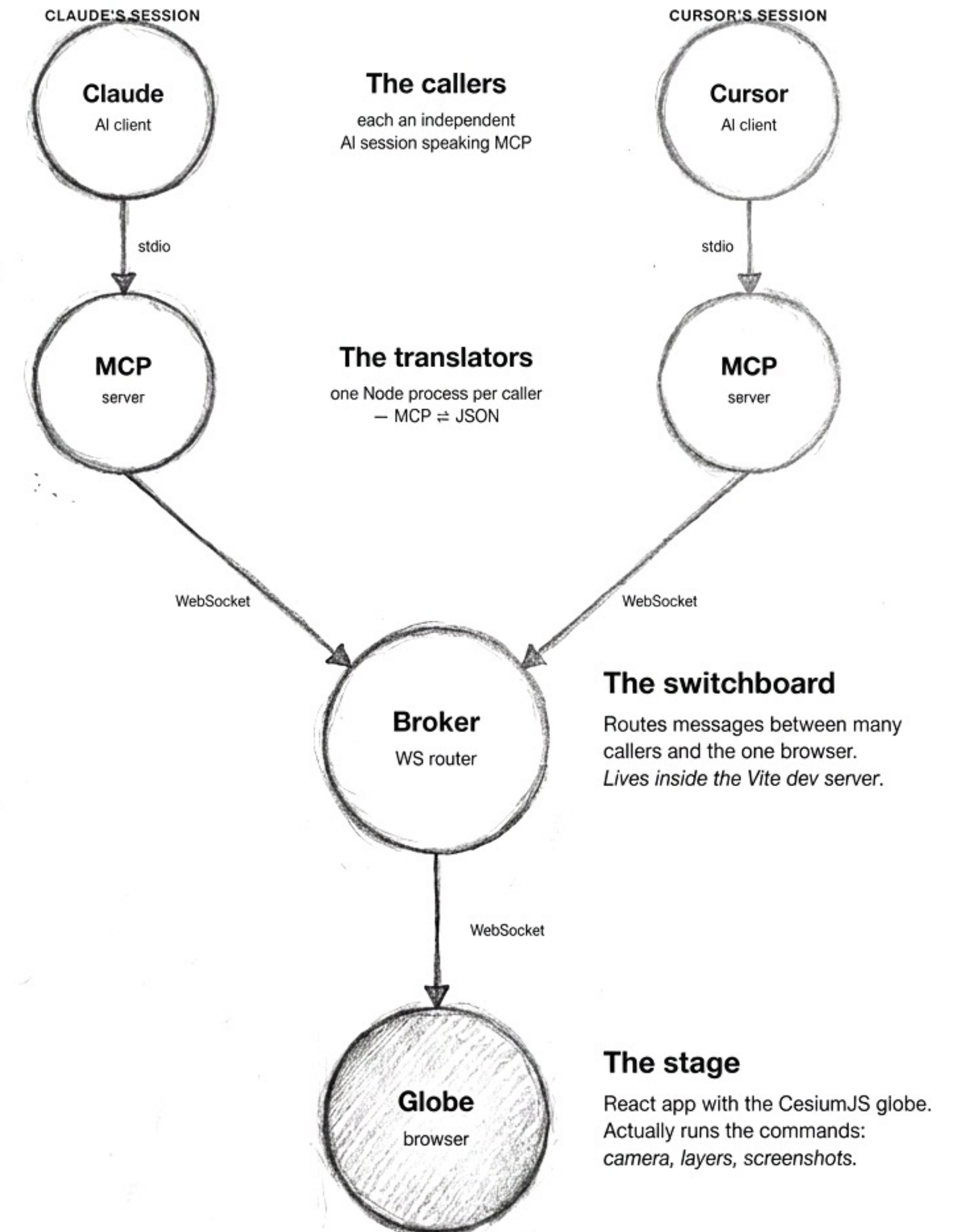


# I wire MCP into my projects to make them AI-assistant accessible

- **Expose everything via MCP.** Every function becomes a tool any AI assistant can use.
- **Let the AI drive.** The assistant can automate complex workflows directly.
- **Self-testing dev loop.** It runs the code and tests new features as part of its own cycle.
- **Iterate until it works.** Watch error logs, capture screenshots, keep going.

## Worldscope MCP

Many AI clients, one live globe — joined by the broker



Every AI client brings its own **translator**.

The **switchboard** merges them into one live session on the globe.

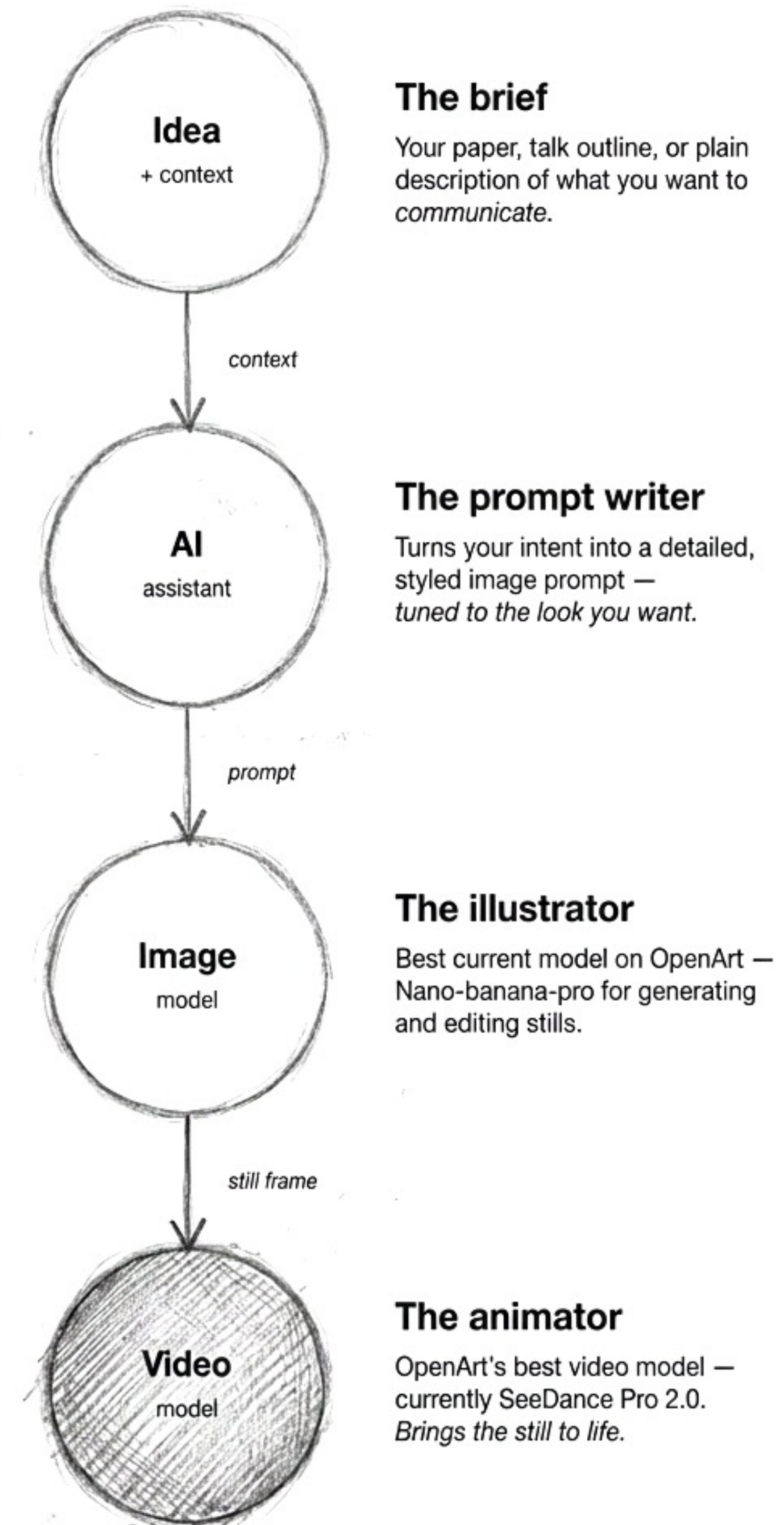
Add a third client — ChatGPT, a custom agent — and it just joins the flow.

# I use AI to make my visuals, too

- **Give full context.** Hand over the paper, outline, or talk so the AI knows what you need.
- **Let AI write the prompt.** Have it draft a detailed image prompt in the style you want.
- **Use the best model right now.** Feed the prompt to whatever generator is best at the moment.
- **OpenArt wraps many models.** Nano-Banana-Pro is currently my favorite for stills.
- **SeeDance Pro 2.0 for video.** Best video model I've found right now on OpenArt.

## AI Image & Video Workflow

From idea → prompt → image → video

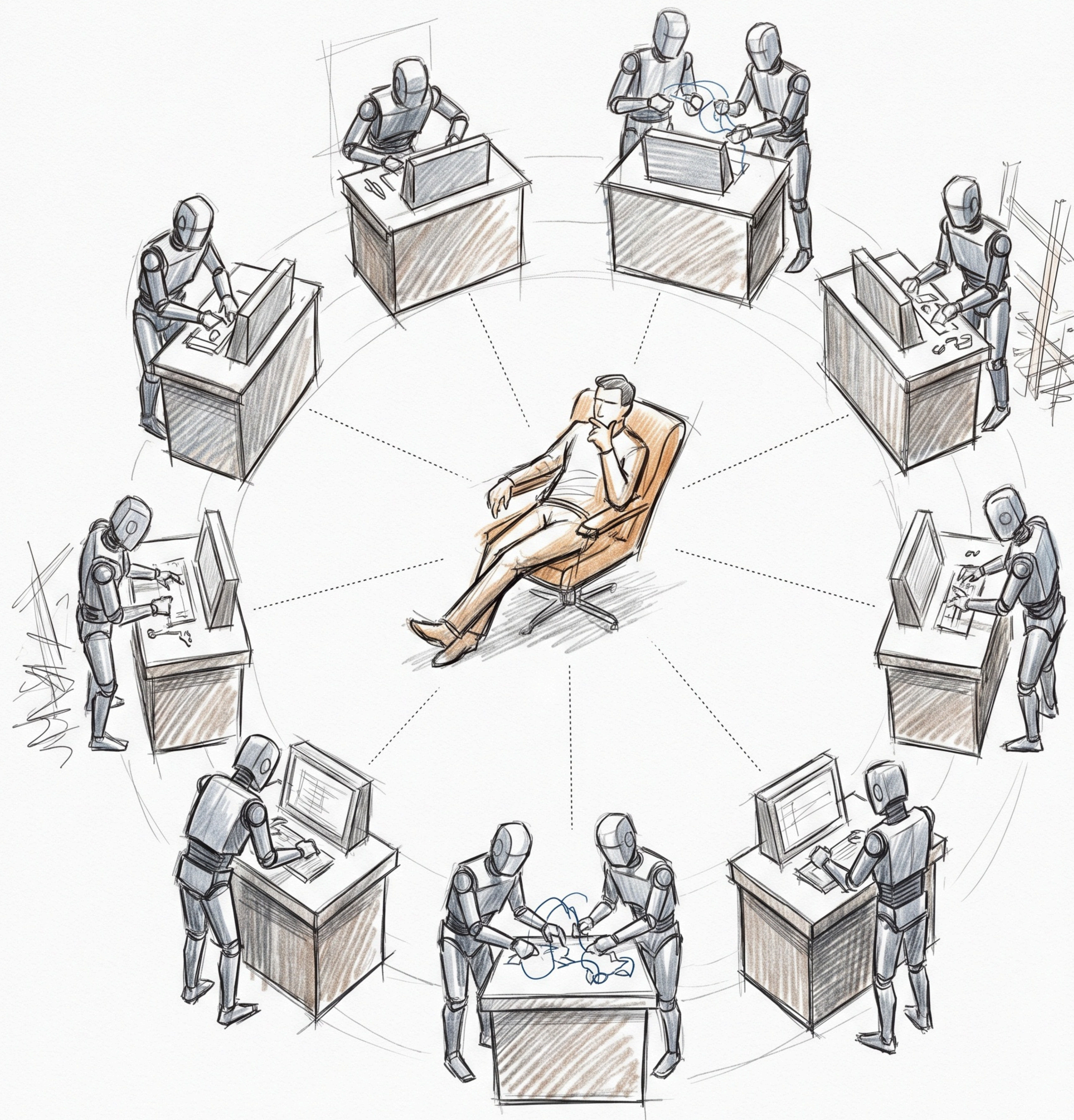


Give the AI your **full context**, let it write the prompt, then run the prompt through the best image & video models of the moment.

*The models change — the workflow doesn't.*

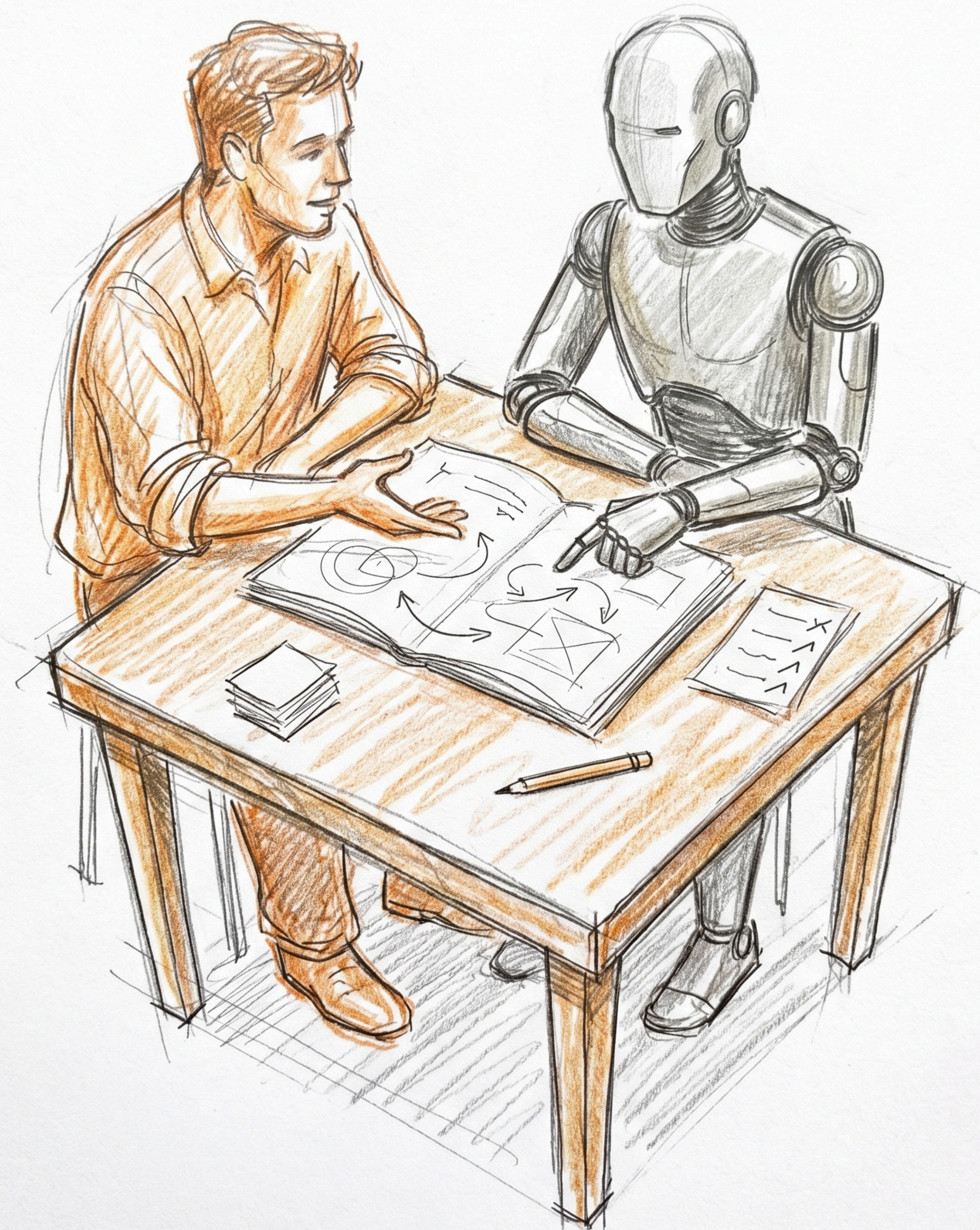
# The human is the bottleneck. Delegate.

- **Parallelize.** Run 1–20 agents at once.
- **Don't micromanage.** Less oversight = more output. Step in only when needed.
- **Delegate real work.** Give them a branch. Let them spin off subagents.
- **Check in, don't hover.** Review and redirect at reasonable intervals.
- **Remove friction.** Grant enough permissions to run without approval prompts.
- **Require proof.** Require logs, screenshots, and tests. Iterate until it works.
- **Stay focused.** New idea? Open another terminal for research.



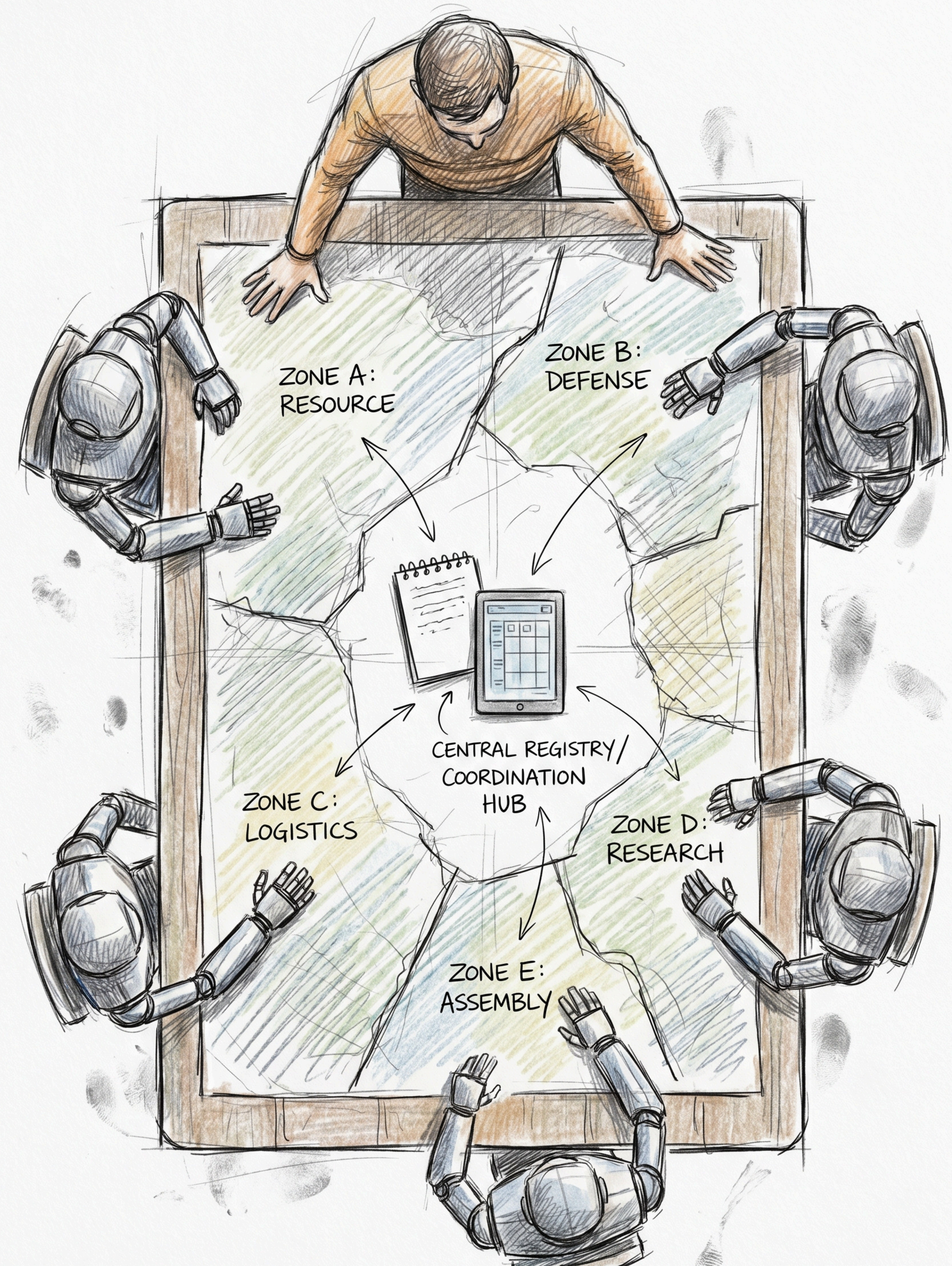
## Development is a genuine back and forth conversation

- **Weigh tradeoffs together.** Ask Claude's opinion on options before committing.
- **Plan the division of labor.** Discuss parallel work with one instance first.
- **Plan before building.** Write a detailed plan for every major feature to a file.
- **Coordinate parallel agents.** Keep a registry of active sessions so instances don't collide.
- **Avoid duplication.** Even in branches, no duplicate or conflicting features.



## Plan and Coordinate Together

- **Weigh tradeoffs together.** Ask Claude's opinion before committing.
- **Divide the work upfront.** Discuss parallel tasks with one instance first.
- **Plan before building.** Write detailed plans to a file so you don't lose context.
- **Coordinate parallel agents.** Maintain a session registry so instances know what others are doing.
- **No conflicts.** Even in branches, avoid duplicate or overlapping features.



## Don't be shy about interrupting and requesting course corrections

- **Interrupt early.** Press escape the moment Claude heads the wrong direction.
- **Commit often.** Always before pushing, so you can roll back if needed.
- **Log everything.** Ask Claude to write up what you did and learned each session.
- **Run a retro.** Ask what skills, tools, or workflows could have made it faster.



# New Updates Daily

- While building this presentation:
  - **Claude Opus 4.7** replaced 4.6 as the best available model
  - **Claude Desktop 2.0** code environment got major improvements
  - **Claude.ai Design tool** launched
  - **SeeDance Pro 2.0** video model dropped (used for the videos in this talk)
  - **Hermes agent** is replacing OpenClaw as the go-to choice
  - Two powerful **local TTS models** released
  - **All in less than a week.**
- Development is nearly instant now. Companies and individuals can ship new software almost every day if they choose to.

