

From Pixels to Policies: AI for Climate Risk and E2E Reproducibility

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GAME 2026 – Generative AI Modelling for Extreme Events

Bologna, 12 June 2026



Unipol Group and Leithà

Unipol



It is the Group's multi-branch insurance company, covering the full range of insurance products and **16.8** million customers



Leader in the non-life sector with a market share of **19%** in Italy



First Group by market share **23%** in the health business



Leader in the telematic insurance sector with a market share of **55%** in Italy and about **3.5** million black boxes installed



Leithà



The centre of expertise for the Unipol Group in the **data science** and **computer science** areas.



120+ **passionate** data and computer scientists working across Bologna, Milan, Rome, Turin



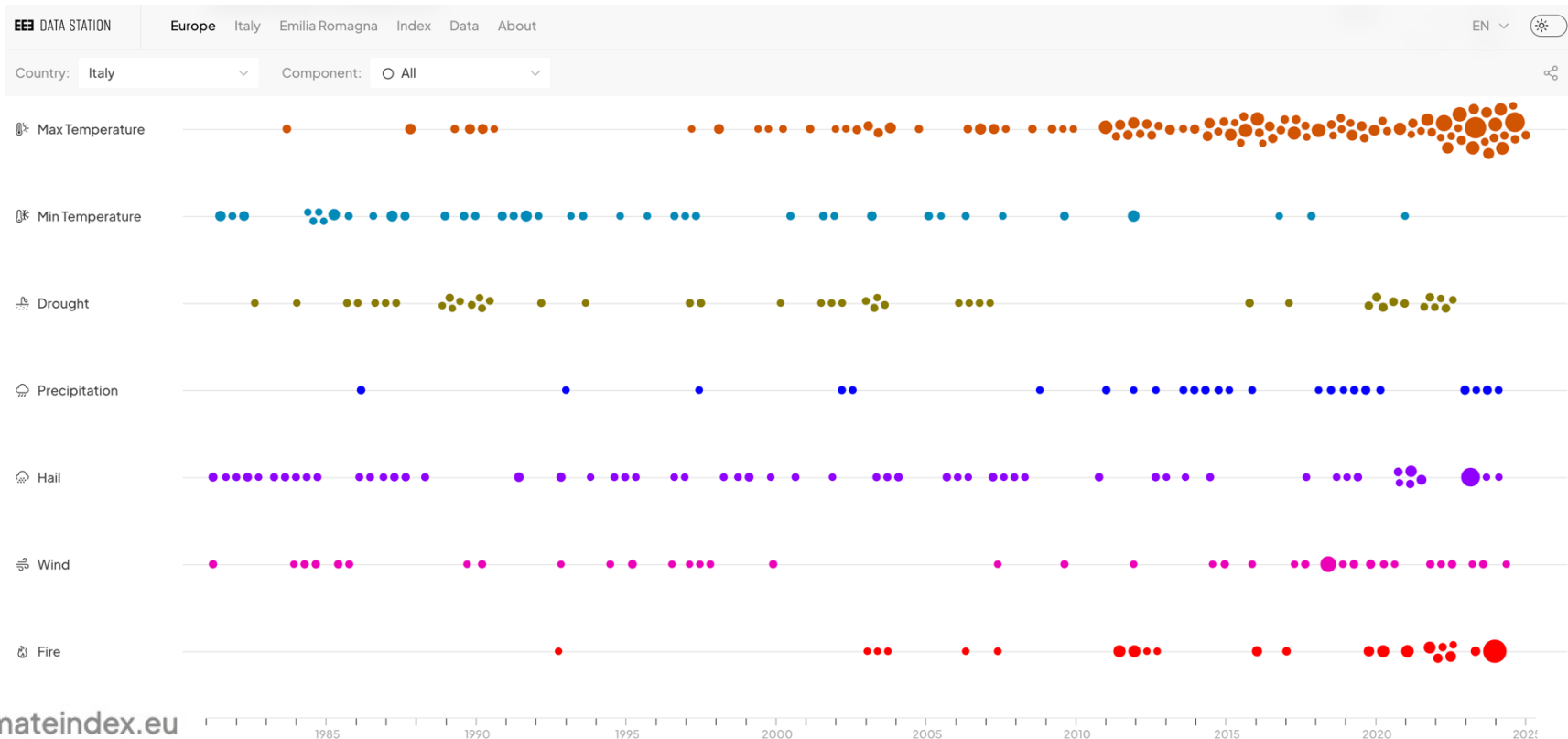
The name “Leithà” comes from the Indo-European root Leith, which gave rise to the term '**Leader**'.



Leithà supports the operations of the Unipol Group companies by designing and developing **data-driven** and **data-intensive** services.



Extreme events in Italy

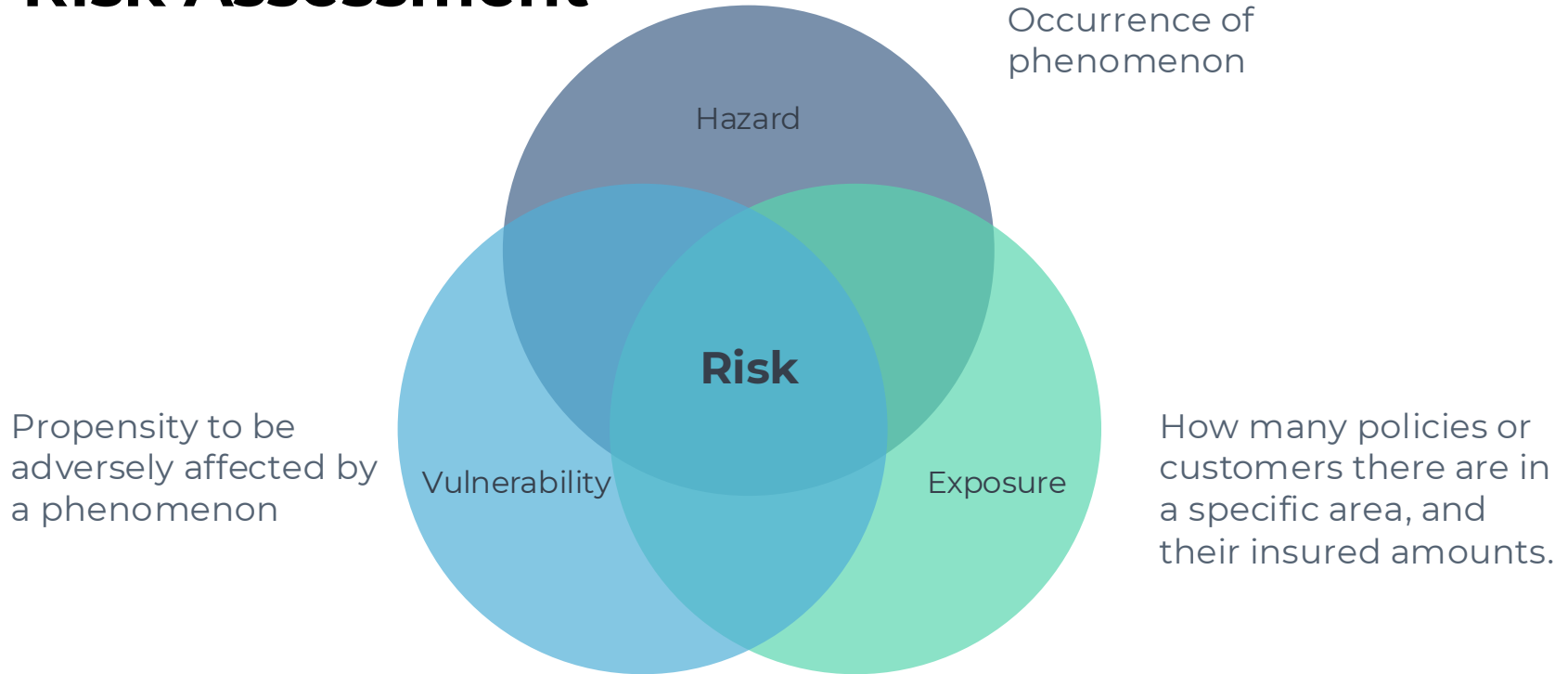


Main areas of interest



Risk Assessment

Risk Assessment



Risk Assessment



Hazard



Vulnerability

Vulnerability assessment



Collecting characteristics of **buildings** to improve pricing models

Classic approach

- Ask the customer for information
- Technicians on the field

Data driven approach

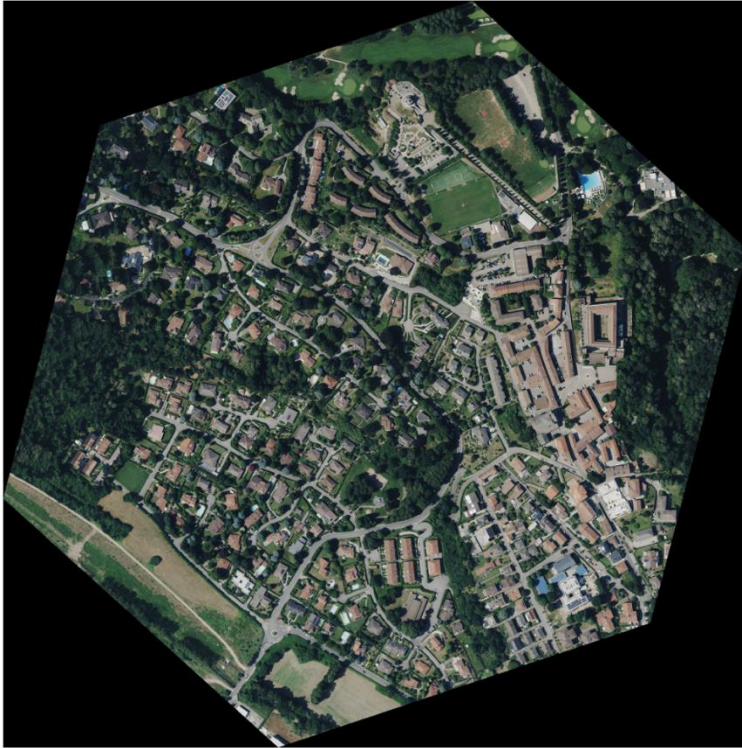
- Aerial, Satellite, Street-level imagery
- Open Data from public entities (e.g. property records)
- Commercial third-party data



Vulnerability assessment



H3 Level 8 (0.74 km²) – 7cm ground resolution - 700MB



Vulnerability assessment

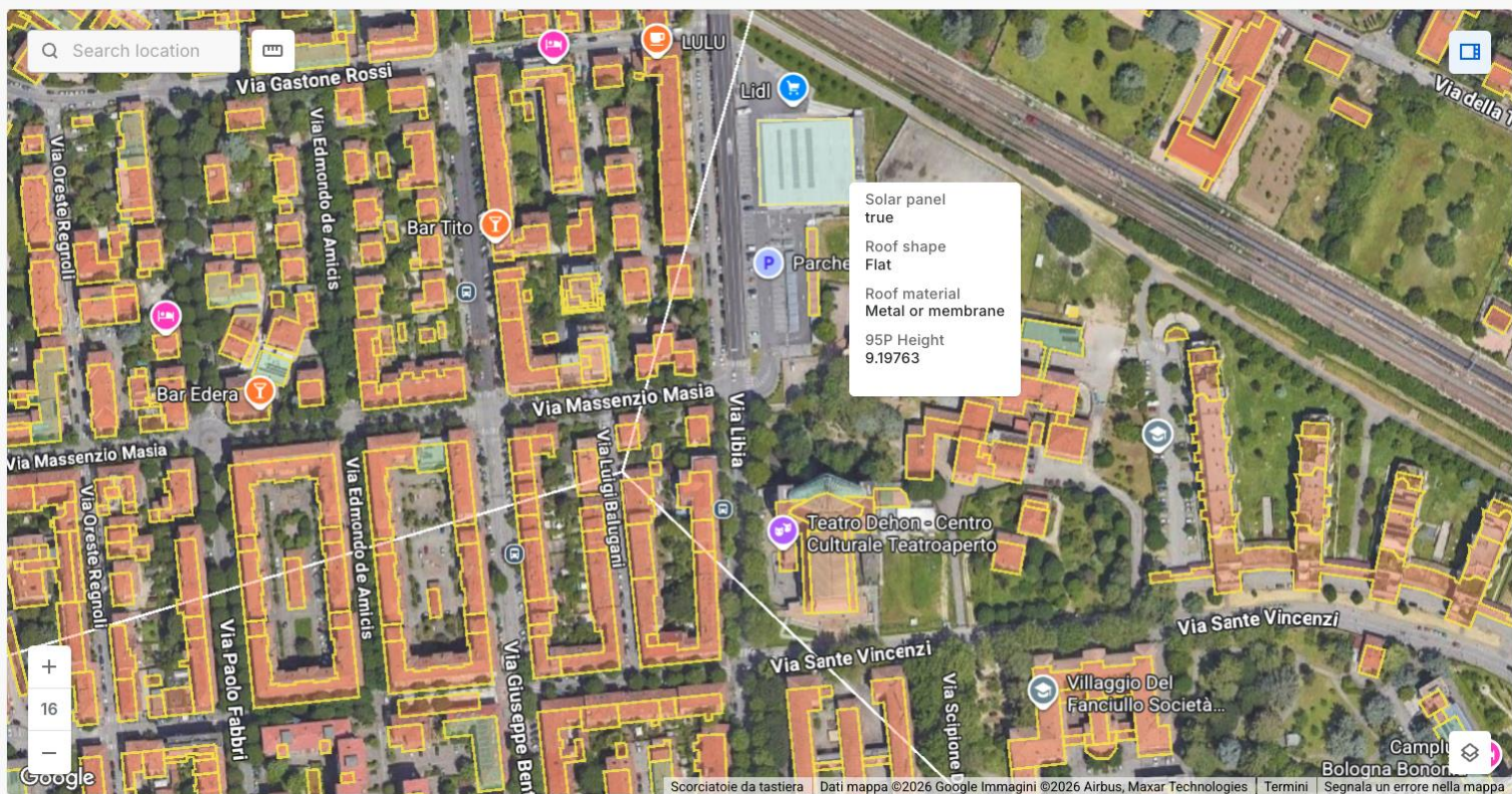
Solar panels with a standard CNN



SOLAR PANELS	PRECISION	RECALL	F1-SCORE
NO	83%	98%	90%
SI	98%	81%	89%

Roof shape with different multimodal GenAI models

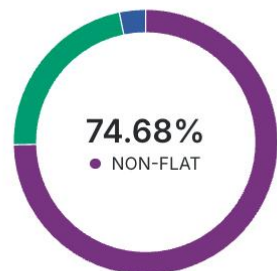
Class	Metric	Qwen3.5-35B	DeepSeek-VL2	Gemini 2.5 Flash	Gemini 2.5 Pro
Flat	Precision	83%	83%	86%	83%
	Recall	83%	93%	90%	93%
	F1	83%	88%	88%	88%
Non-Flat	Precision	93%	97%	97%	98%
	Recall	94%	95%	95%	94%
	F1	94%	96%	96%	96%



Widgets

Roof shape

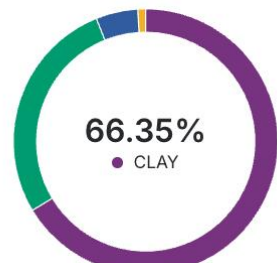
All



● NON-FLAT ● FLAT ● UNKNOWN

Roof material

All



Buildings

Risk Prevention

Nowcasting

Nowcasting refers to short-term weather forecasting, typically within 1-3 hour horizon

Forecasts **updated frequently**, with very low inference times

Enables detection of **rapidly changing weather dynamics**

Provides **timely alerts** and **actionable information** to clients



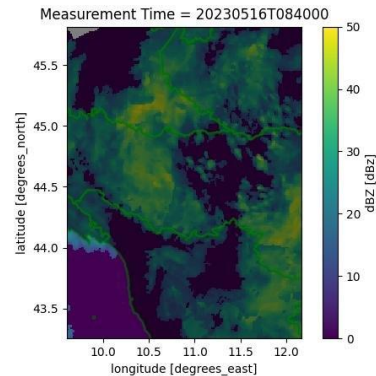
Nowcasting

Based on DeepMind's **DGMR**, a spatio-temporal GAN using CNNs for probabilistic rainfall nowcasting.

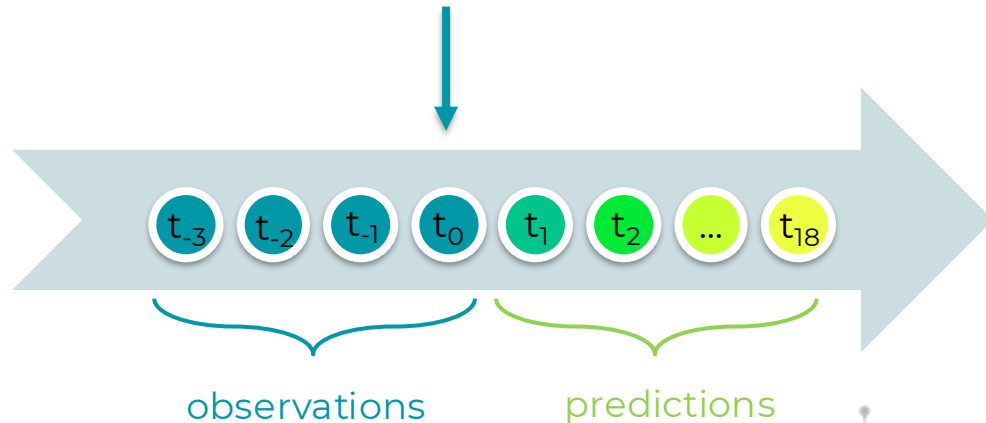
Inference uses the latest **radar image** at time **t_0** together with the **previous 30 minutes**

Generates 18 images at 1 Km spatial resolution and 10-minute intervals, covering the **next 180 minutes**

Produces a new prediction every **10 minutes**, each prediction requires less than **5 minutes**



weather radar reference



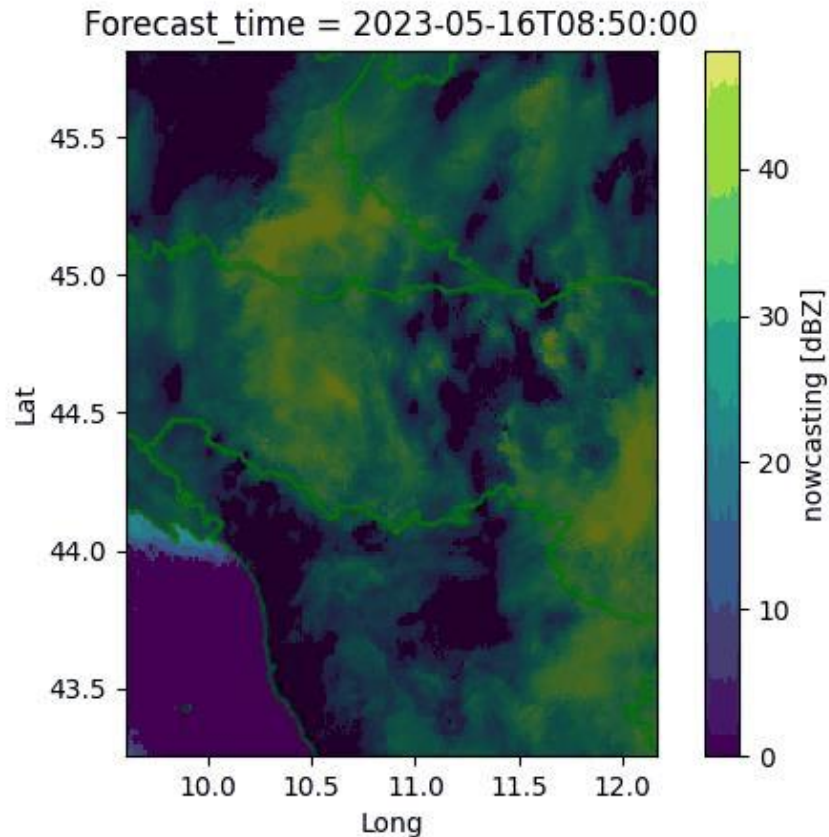
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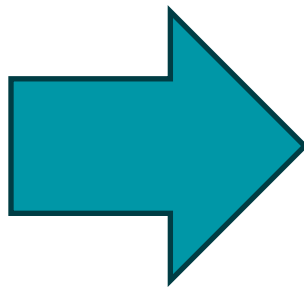
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Alert SMS





**Prevista Grandine /
Temporali Forti ***

MARIA,
Proteggi i tuoi beni da possibili danni da
grandine prevista:

**MONCENISIO**

**il 09/08**

**In serata**

[Informativa sul servizio](#)

[Non voglio più ricevere avvisi grandine](#)

Enabling Technologies

Reproducibility matters everywhere

research ⇔ *industry*

Reproducibility matters everywhere

research $\rightleftharpoons$ *industry*



In research

a claim is verifiable and defensible over time.

Reproducibility matters everywhere

research ⇔ *industry*



In research

a claim is verifiable and defensible over time.



In industry

a model can be rebuilt, audited, and rolled back.

Reproducibility matters everywhere

research ⇔ *industry*



In research



In industry

a claim is verifiable and defensible over time.

a model can be rebuilt, audited, and rolled back.

Same goal, two worlds — trust through repeatability.

Reproducibility matters everywhere

research  *industry*



In research

a claim is verifiable and defensible over time.

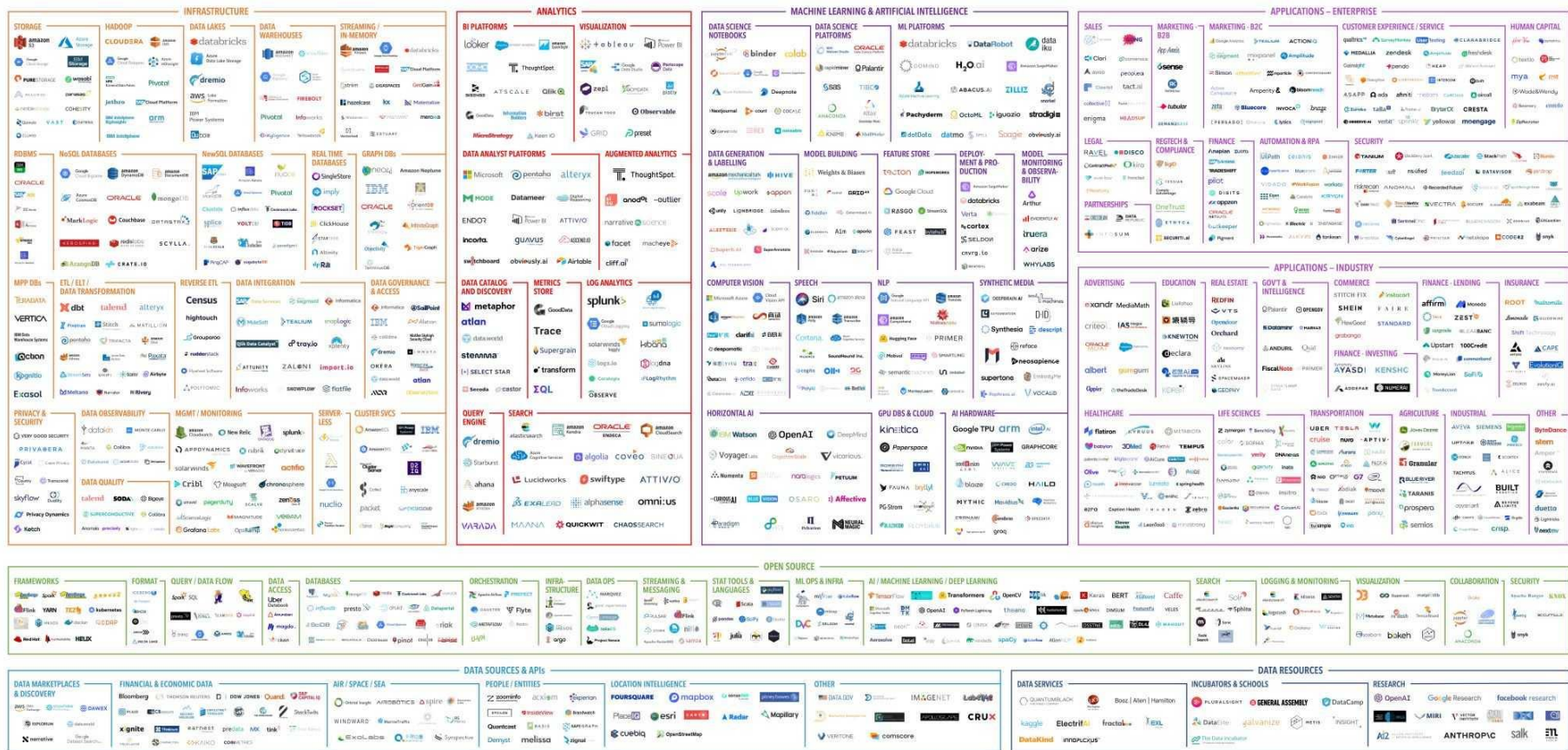
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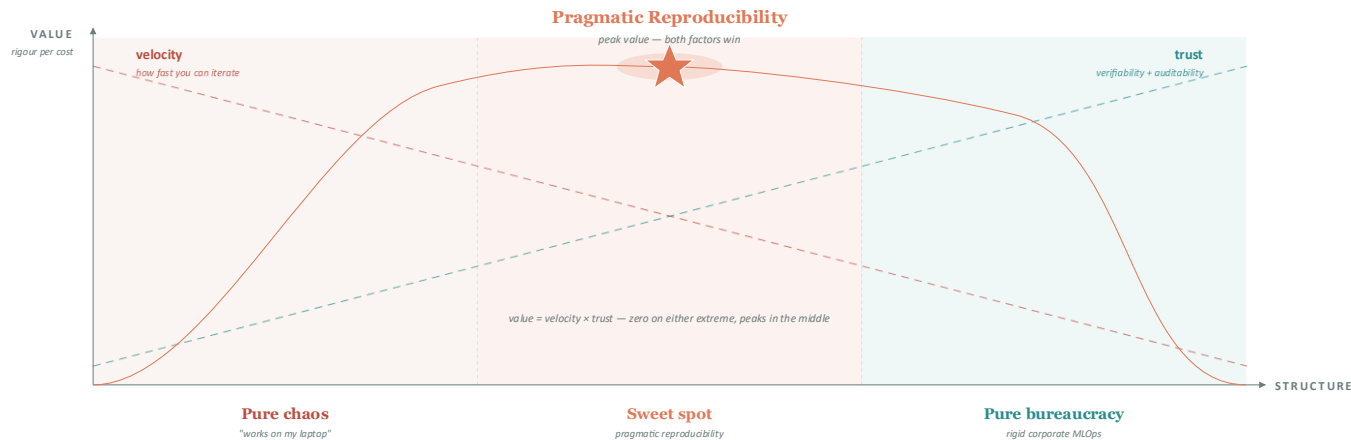
MLOps

At the rescue

Same goal, two worlds – trust through repeatability.



The middle isn't a compromise



LEFT EXTREME

Fast — but nothing survives.

Results can't be reproduced. Models drift silently. Decisions can't be defended.

Velocity is high. Trust is zero.

THE SWEET SPOT

Verifiable AND productive.

Statistical replicability + full traceability.
Sandbox stays free; gating only at the prod chain.

Velocity + trust both stay high.

RIGHT EXTREME

Auditable — but frozen.

Every change gated. Forms, approvals, signoffs.
Iteration dies. Research stalls.

Trust is high. Velocity is zero.

It is the only place where velocity x trust is maximized

Our sweet spot



Data

source · version · checksum ·
contract



Filter

rules + thresholds as
versioned config



Prepare

lineage · transforms · splits ·
seeds



Train

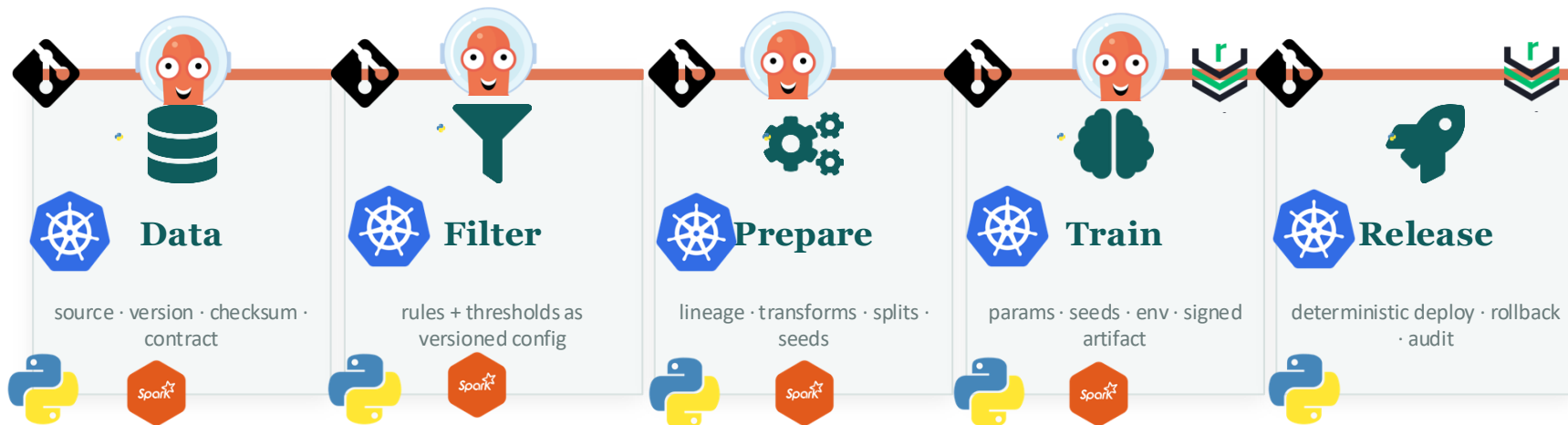
params · seeds · env · signed
artifact



Release

deterministic deploy · rollback
· audit

Our sweet spot



thank you

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