

# LF AI: Accelerating Open Source AI Innovation and Collaboration

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 THE **LINUX** FOUNDATION

 LF AI

# Ecosystem Overview

Machine Learning

Framework

Platform

Library

Framework

Platform

Library

Tool

Reinforcement Learning

Programming

Notebook Environment

Versioning

Store & Format

Operations

Stream Processing

SQL Engine

Feature Engineering

Visualization

Pipeline Management

Labeling and Annotation

Governance

Benchmarking

Training

Parameter

Format & Interface

Marketplace

Workflow

Inference

Tool

Explainability

Adversarial

Bias & Fairness

Computing & Management

Interface

Security & Privacy

Natural Language Processing

Education

Accord.NET

FedAI

Microsoft LightGBM

MAHOUT

ML.NET

RAY

Angel

LFAI Graduated

Ax

cortex

H2O

Kubeflow

mlflow

RedHatch IQ

SELODA

YANFAI MARKET

Alibaba Alink

Apache SystemML

Carthoo

Spark MLlib

mlpack

Feast

openml

Locust

將軍 Shogun

Sonnet

salesforce TransmogitAI

drml XGBoost

xLearn

SINGA

Chainer

Microsoft CNTK

dy/net

Alibaba Euler

[M]S

mindSpore

mxnet

keras

Pythia

PYTORCH

TensorFlow

DeepDetect

Determined AI

BigDL

Catalyst

BoTorch

Intel Distiller

jina

Polyaxon

DL4J

Keras

aplaidML

PyTorch Lightning

PyTorch

tvm

Coconut RL

Coach

DeepMind Lab

Dogecoin

Horizon

OpenAI

Google PlanNet

Google SEED RL

Stable Baselines

Pyro

LFAI Incubating

julia

Numpy

NYOKA

pmigrate

PyMC3

SciPy

Stan

Apache Zeppelin

BeakerX

colab

Elyra

IPython

jupyter

IBM

PolyNote

Streamlit

Datascience Connect

DC

Quilt

Milvus

LFAI Incubating

druid

hudi

vearch

vespa

ALLUXIO

ARROW

PARQUET

DELTA LAKE

PILOSA

Amundsen

LFAI Incubating

MARQUEZ

LFAI Incubating

FEAST

LFAI Incubating

Delta Hub

snorkel

NNStreamer

LFAI Incubating

Flink

kafka

PREFECT

brooklyn

Samza

Uber unreplicator

Apache Drill

presto

SQLFlow

Featuretools

tsfresh

bokeh

plotly Dash

Uber deck.gl

Google Facets

Grafana

RCloud

NYU

Google TensorBoard

Analytics Zoo

beam

DAGSTER

TPOT

Intel CVAT

Doccane

Labelbox

HITACHI

Labeling

Microsoft VERT

Consistency Data Access

EGERIA

DAWNBench

MLPerf

NeuroPOP

LFAI Graduated

LDWIG

LFAI Incubating

H

talos

ONNX

LFAI Graduated

Acumos

LFAI Graduated

Airflow

nifi

argo

Azkaban

Cadence

CYCLONE

DataBolt

Flyte

luigi

mleap

PREFECT

TRAINS

ADLX

LFAI Incubating

MNN

NVIDIA

uTensor

FACEBOOK dnn

amazon Neo-AI

NETRON

Google studio.ml

aws TorchServe

AI Explainability 360

LFAI Incubating

Microsoft interpret

UNIVERSITY OF WASHINGTON Lime

SHAP

SKATER

Treeinterpreter

ALERT

ELIS

Google Lucid

Bolt

Adversarial Robustness Toolbox

LFAI Incubating

AdvBox

advers torch

hans

Facebook

AI Fairness 360

LFAI Incubating

Aequitas

Audit AI

Fairlearn

EDL

SOAJS

Bahir

MESOS

Apache Ranger

STORM

GNSS

NETFLIX genie

kubernetes

Intel Nauta

Singularity

sparklyr

LFAI Incubating

APACHE TORE

LTVY

Apache Hadoop

QR Code

The LF AI landscape explores open source projects in the domains of artificial intelligence, machine learning, and deep learning.

l.fai.foundation

LF AI Landscape

LF AI

Google Differential Privacy

IBM HElib

Microsoft SEAL

SUBSTRA

Google TensorFlow Privacy

TF Encrypted

DELTA

LFAI Incubating

FACEBOOK LASER

mosquit

cisco

Intel NLP Architect

ENLP

ParIAI

FACEBOOK Pytorch

Google ALBERT

AllenNLP

Google Bert

LUON

Kashgari

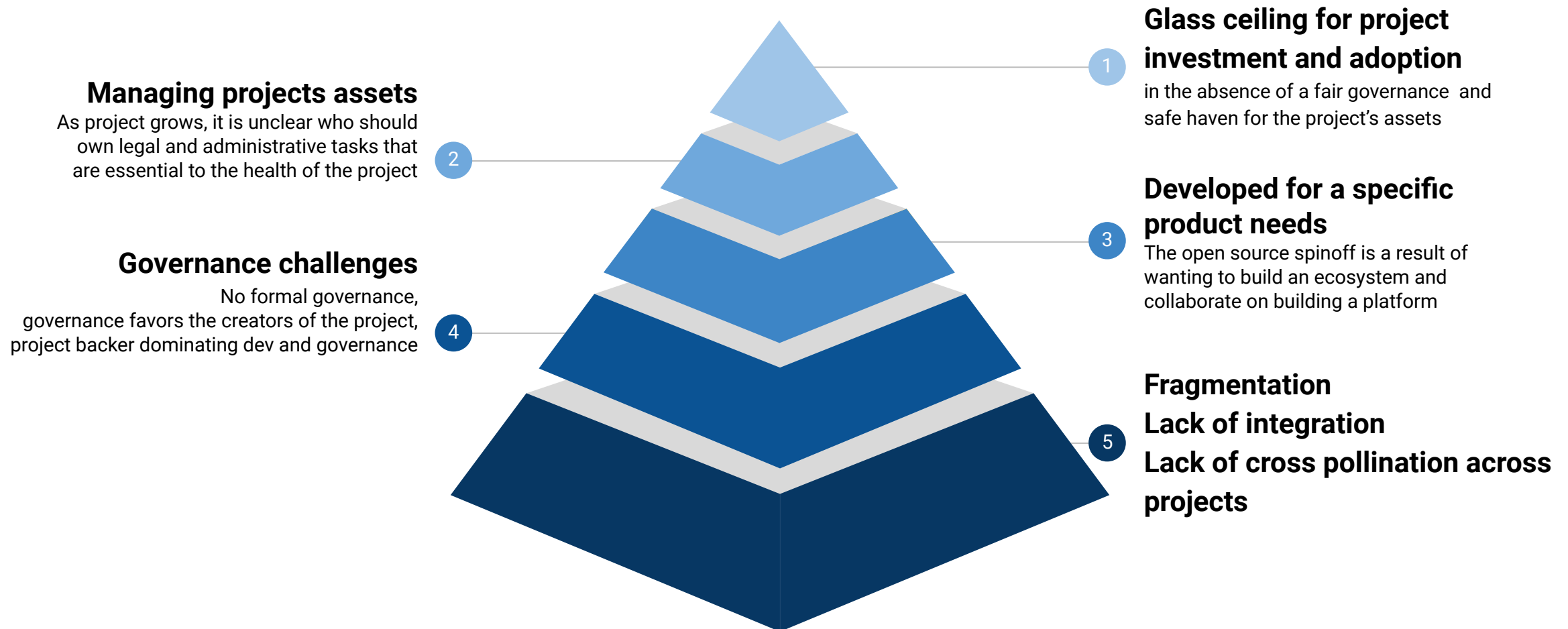
Transformers

FACEBOOK XLM

YouTubeToMe

OpenDSAI

# Open Source AI - Ecosystem Challenges



# We all are aware of the advantages of open source ...

**Access to  
source code**

**Ability to  
customize**

**Rapid  
development**

**Peer review**

**Improved  
quality and  
security**

**Reduce dev  
time and TTM**

**Flexible  
licensing model**

**Community  
driven  
innovation**

**Influence  
roadmap via  
participation**

**Transparent  
technical  
discussions**



# But, Open Source offers *unique* benefits to AI

## Fairness

Methods to detect and mitigate bias in datasets and models, including bias against known protected populations

## Robustness

Methods to detect alterations/tampering with datasets and models, including alterations from known adversarial attacks

## Explainability

Methods to enhance understandability and interpretability by persona/roles in process of AI model outcomes/decision recommendations, incl ranking and debating results and decision options

## Lineage

Methods to ensure provenance of datasets and AI models, including reproducibility of generated datasets and AI models

## Open Data

Methods to clean, sort, tag and track provenance and a governance structure for doing these things



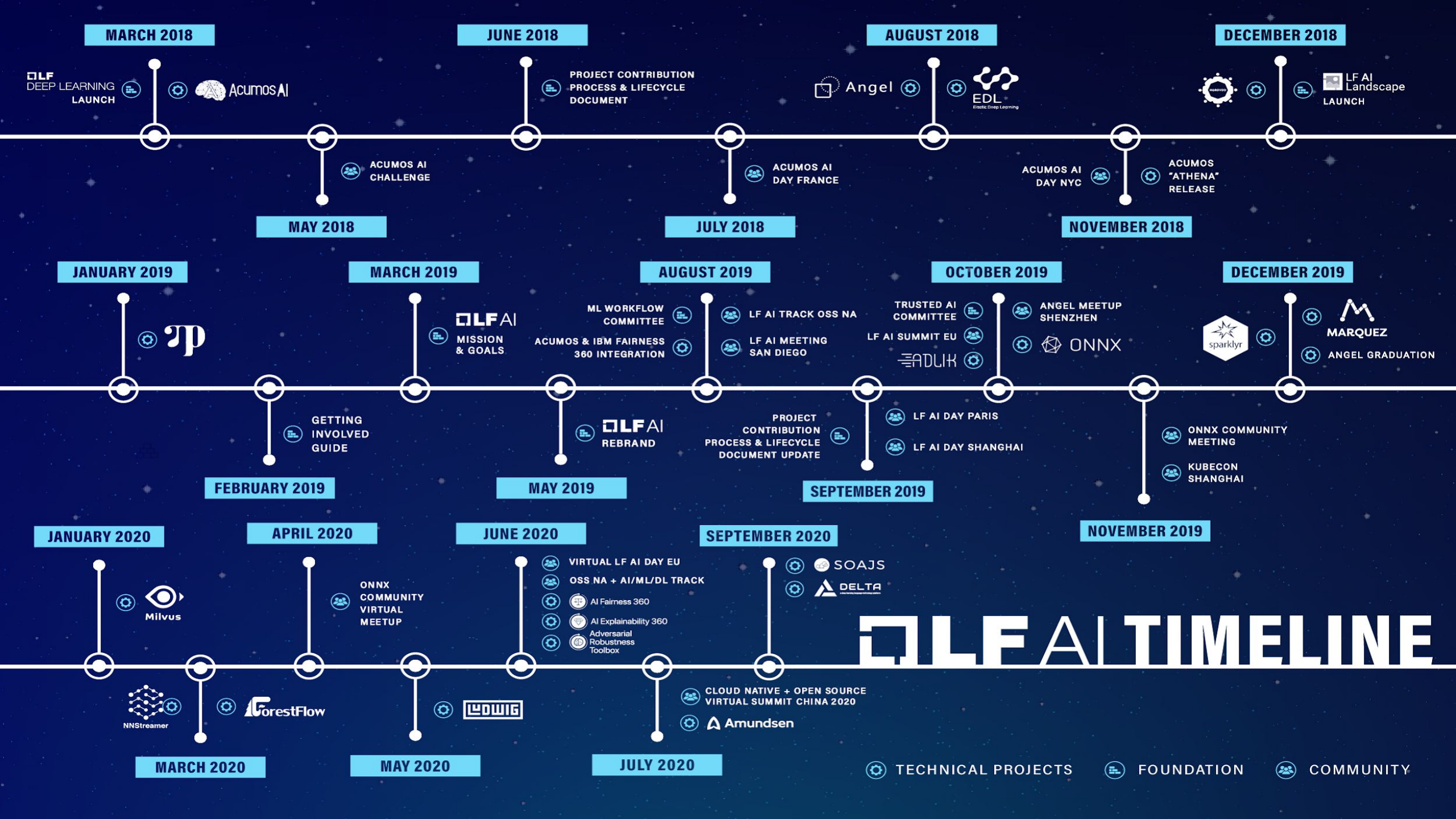
LF AI is an LF umbrella foundation founded in March 2018 to support collaboration and open source innovation in the AI, ML, and DL

<https://lfai.foundation>

# Motivations for Harmonization

1. **Better interoperability and capabilities** across projects
2. Hosting projects under a single umbrella enables **closer collaboration and integration** across projects and is a proven recipe for building a strong open ecosystem and growing the ecosystem
3. **Unified guidance for end users** on tools, interoperability, integration, standards, and the future of AI, Data and Analytics as its use continues to grow in every industry
4. **Greater efficiency** for members across various costs spent on supporting





# LF AI Structure and Governance

## Foundation Governance

Funding effort to support technical projects hosted under the Foundation

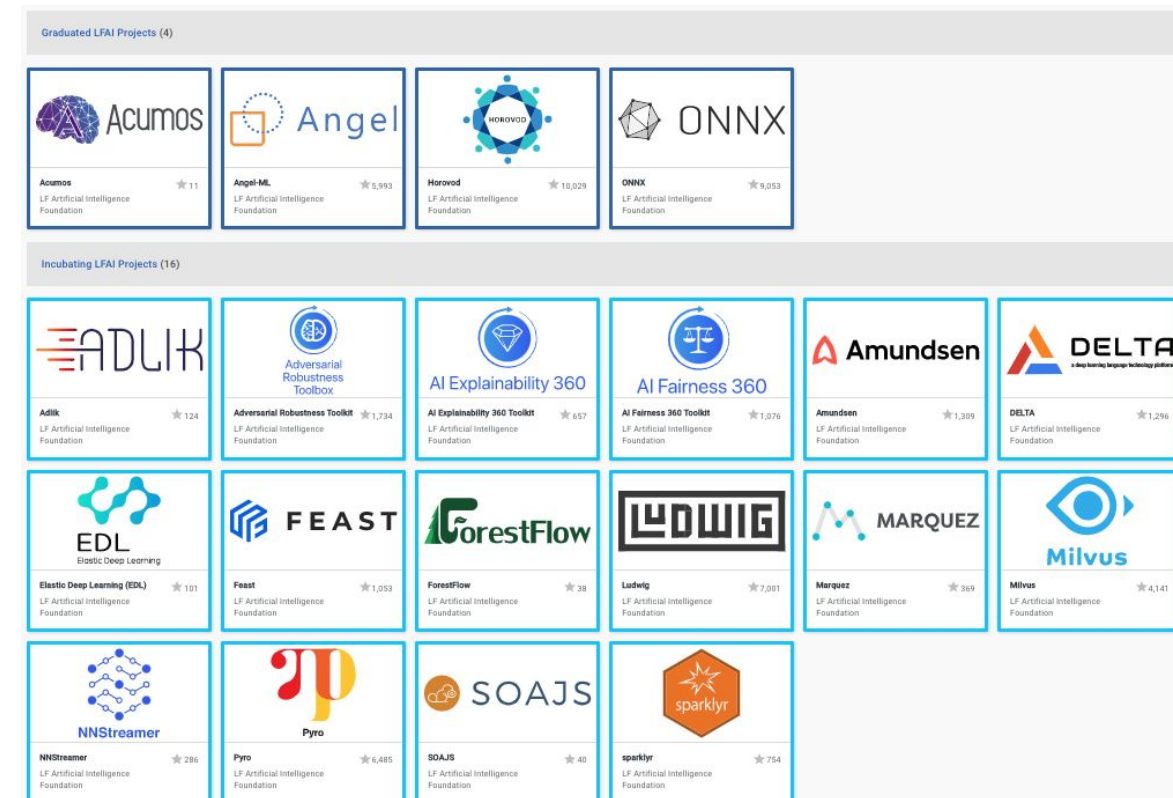


## Technical Coordination and New Initiatives

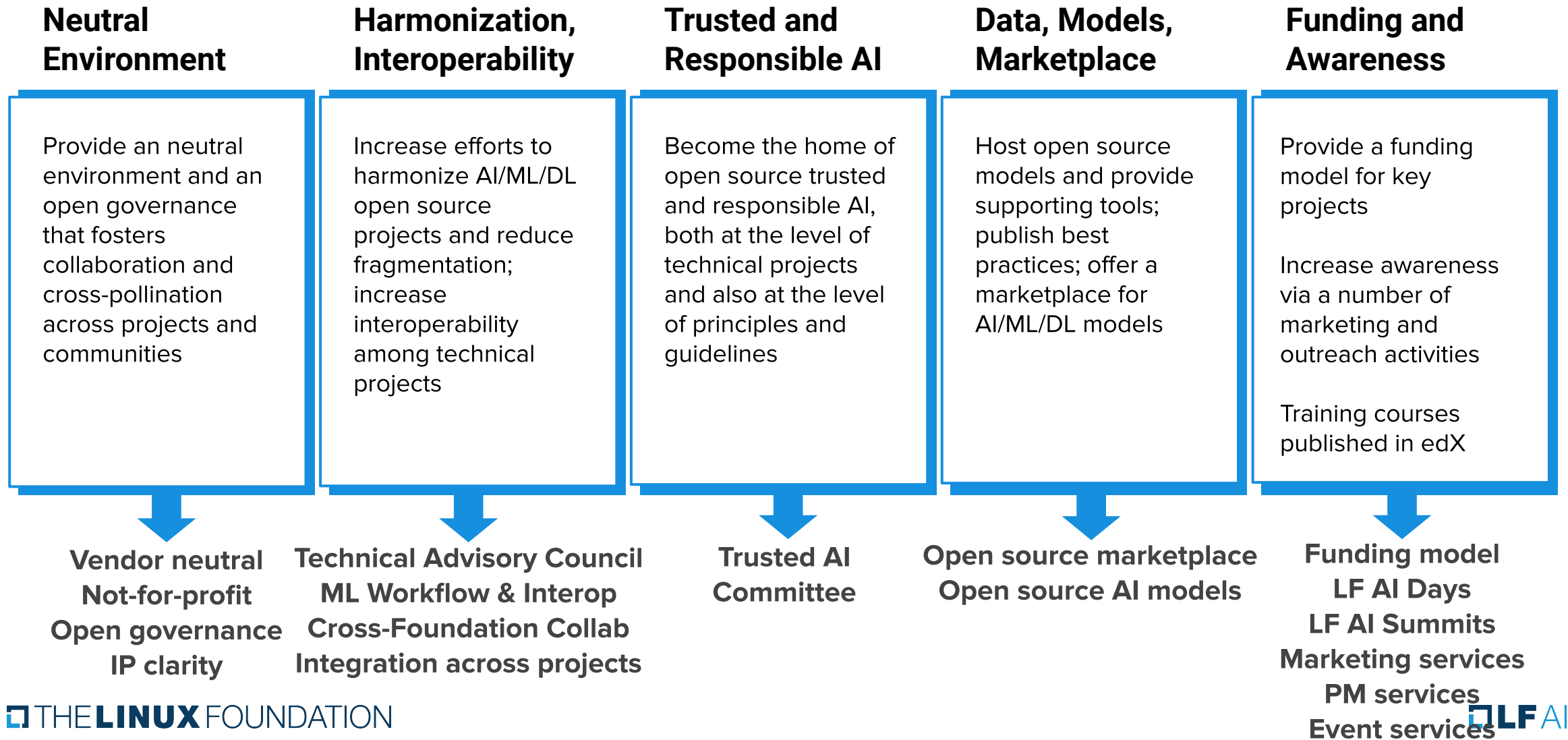


## Hosted Projects

Projects have their own independent technical governance



# LF AI Major Efforts



# Members

## Premier



## General







## Associate





















# Projects

## Graduated LFAI Projects (4)

 <b>Acumos</b> LF Artificial Intelligence Foundation ★ 11	 <b>Angel</b> Angel-ML LF Artificial Intelligence Foundation ★ 5,993	 <b>Horovod</b> LF Artificial Intelligence Foundation ★ 10,029	 <b>ONNX</b> LF Artificial Intelligence Foundation ★ 9,053
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## Incubating LFAI Projects (16)

 <b>Adlik</b> LF Artificial Intelligence Foundation ★ 124	 <b>Adversarial Robustness Toolkit</b> LF Artificial Intelligence Foundation ★ 1,734	 <b>AI Explainability 360</b> AI Explainability 360 Toolkit LF Artificial Intelligence Foundation ★ 657	 <b>AI Fairness 360</b> AI Fairness 360 Toolkit LF Artificial Intelligence Foundation ★ 1,076	 <b>Amundsen</b> LF Artificial Intelligence Foundation ★ 1,309	 <b>DELTA</b> LF Artificial Intelligence Foundation ★ 1,296
 <b>EDL</b> Elastic Deep Learning LF Artificial Intelligence Foundation ★ 101	 <b>Feast</b> LF Artificial Intelligence Foundation ★ 1,053	 <b>ForestFlow</b> LF Artificial Intelligence Foundation ★ 38	 <b>Ludwig</b> LF Artificial Intelligence Foundation ★ 7,001	 <b>Marquez</b> LF Artificial Intelligence Foundation ★ 369	 <b>Milvus</b> LF Artificial Intelligence Foundation ★ 4,141
 <b>NNStreamer</b> LF Artificial Intelligence Foundation ★ 286	 <b>Pyro</b> LF Artificial Intelligence Foundation ★ 6,485	 <b>SOAJS</b> LF Artificial Intelligence Foundation ★ 40	 <b>sparklyr</b> LF Artificial Intelligence Foundation ★ 754		

# What does it mean to be a Foundation project?

- › A neutral home for the project increases the willingness of developers from organizations to collaborate, contribute, and become committers
- › Endorsement by members of the LF AI's Technical Advisory Committee (TAC) is an independent signal of the quality of your project
- › Open governance model
- › Program management support
- › Access to full-time LF AI staff who are eager to assist your project
- › Access to marketing and communications services to support community and ecosystem engagement
- › Access to a full range of events services to help the project build and grow a community around it
- › Legal support ranging from hosting the trademark in a neutral organization to CLA and DCO system integration with GitHub, regular compliance scans, etc.
- › Presence across multiple geographies



# Companies hosting projects in LF AI

<https://landscape.lfai.foundation/format=hosting>

amazon

AT&T

Baidu 百度

DiDi

DREAMWORKS

FACEBOOK

Herron Tech

IBM

lyft

Microsoft

gojek

R Studio

SAMSUNG

Tech Mahindra

Tencent 腾讯

Uber

wework

ZILLIZ  
Reinvent Data Science

ZTE

# Strong LF AI Marketing/PR Effort

**37 announcements in 2019**

**26 announcements in 1H 2020**

- › Events announcements and promotion
- › Project release
- › Project incubation
- › New members joining
- › Project cross collaboration
- › Invited posts

**LF AI provides marketing services to support community and ecosystem engagement.**

- › Content ranging from the LF AI blog, white papers, posters, presentations, and more
- › Oversee blog editorial calendars and writing, editing, and/or identifying and funding freelancers to develop content
- › Help develop the project website and other required creative work

# LF AI Events - Community Driven

- › LF AI Summit - co-located event with major LF conferences + Booth
- › LF AI Track at Open Source Summit (NA, EU, China) - Supporting 18-20 talks over 3 days + Booth
- › LF AI Days - a whole day (in person and virtual) hosted in collaboration with an LF AI member with audience ranging from 50-250. Multiple/year.
- › Project specific events
- › Sponsorship and booth at KubeCon
- › Strong presence & event participation in China



# Incubating Projects

- › LF AI's TAC committee is responsible to voting in new incubation projects.
- › The TAC meets bi-weekly and generally booked 4-6 weeks in advance.
- › Proposing projects for incubation in LF AI:  
<https://lfai.foundation/proposal-and-hosting-process/>

# Project Resources

Hosted project stages and life cycle:

<https://lfai.foundation/project-stages-and-lifecycle/>

Offered services for hosted projects:

<https://lfai.foundation/services-for-projects/>

# Stay Connected with LF AI

## Social



[@LFAI\\_Foundation](https://twitter.com/LFAI_Foundation)



[LF AI Foundation](https://www.linkedin.com/company/lf-ai-foundation)

## Mail Lists

- › [TAC](#) - Participate in technical governance and hear about LF AI projects
- › [Events](#) - Learn about upcoming events
- › [Announce](#) - Stay in the loop on top level Foundation announcements

## Blog

- › Check the latest news on our [Blog](#)



# Joining LF AI Foundation is easy!

Please follow up with Ibrahim Haddad

Web site	<a href="https://lfai.foundation">https://lfai.foundation</a>
Email	<a href="mailto:info@lfai.foundation">info@lfai.foundation</a>
Landscape	<a href="https://l.lfai.foundation">https://l.lfai.foundation</a>
GitHub	<a href="https://github.com/lfai">https://github.com/lfai</a>
Wiki	<a href="https://wiki.lfai.foundation">https://wiki.lfai.foundation</a>
Mailing lists	<a href="https://lists.lfai.foundation/groups">https://lists.lfai.foundation/groups</a>