LF AI & Data

April 14, 2021

Ibrahim Haddad, Ph.D.
Executive Director, LF AI & Data
Ibrahim@LinuxFoundation.org

LF AI & DATA

Ecosystem Overview

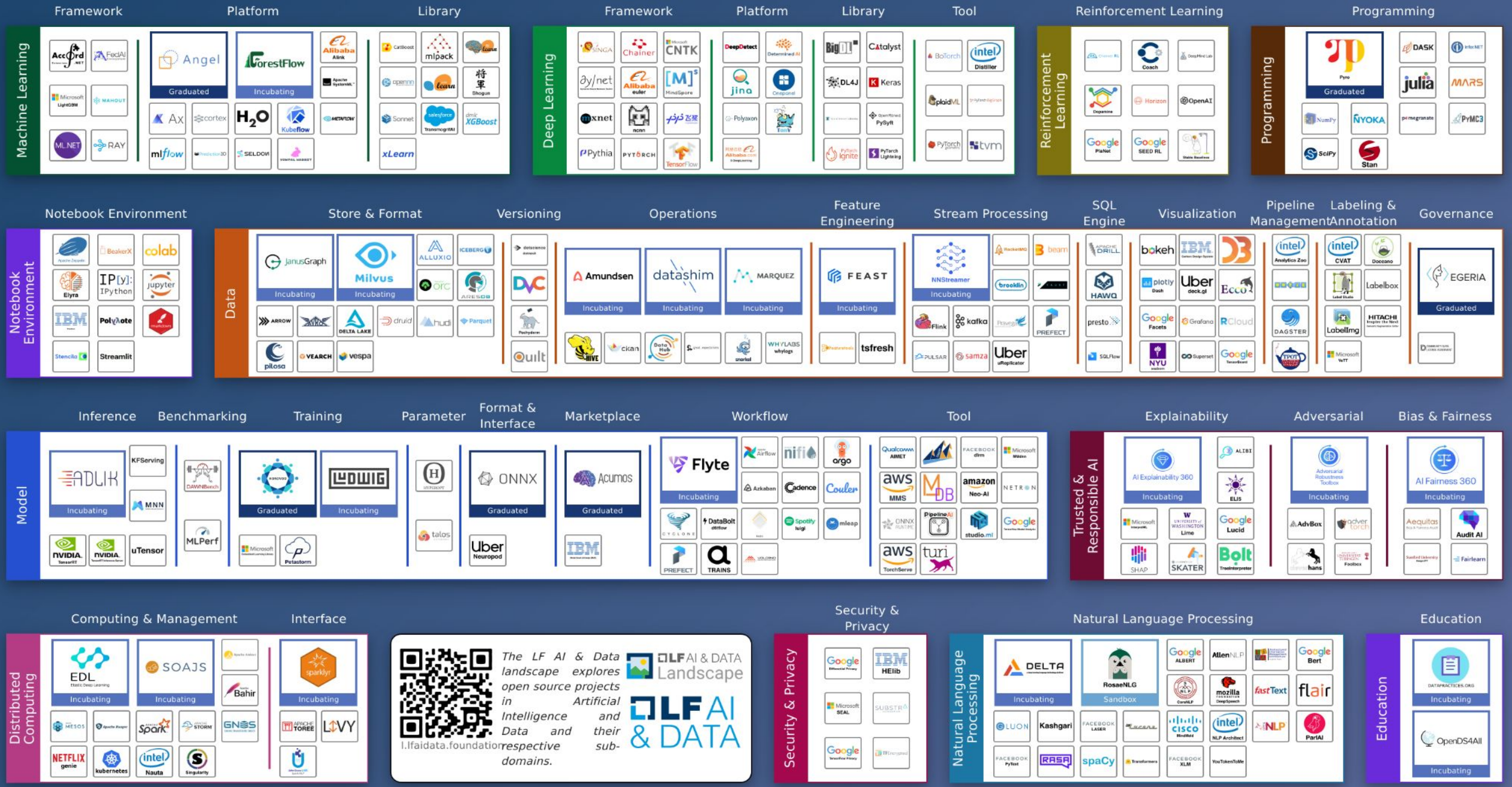
LF AI & DATA

Linux Foundation AI & Data Landscape

2021-04-14T15:46:19Z 6a50231

See the interactive landscape at l.lfaidata.foundation

Greyed logos are not open source



Open Source offers *unique* benefits to AI & Data

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

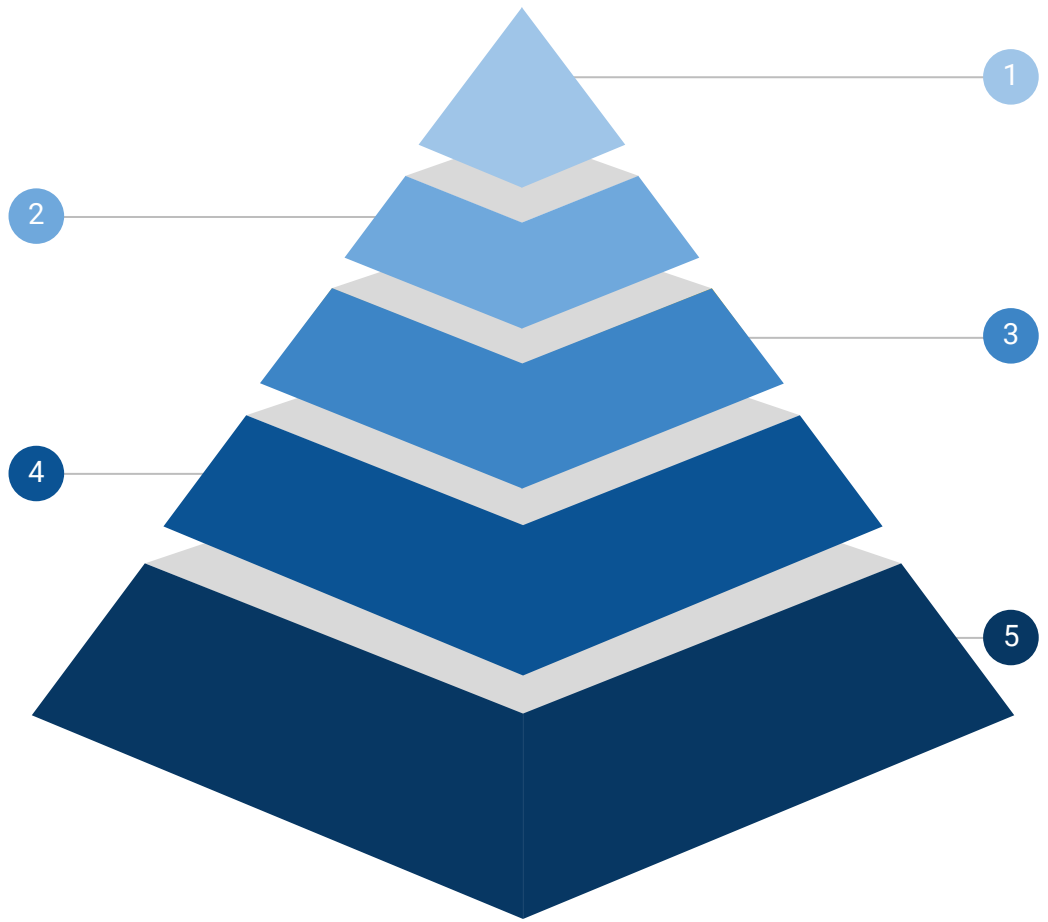
Open Data

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

Open Source AI & Data - Ecosystem Challenges

Managing projects assets
As project grows, it is unclear who should own legal and administrative tasks that are essential to the health of the project

Governance challenges
No formal governance, governance favors the creators of the project, project backer dominating dev and governance



Glass ceiling for project investment and adoption
in the absence of a fair governance and safe haven for the project's assets

Developed for a specific product needs
The open source spinoff is a result of wanting to build an ecosystem and collaborate on building a platform

Fragmentation
Lack of integration
Lack of cross pollination across projects

Enter LF AI & Data

LF AI & DATA

What is LF AI & Data?

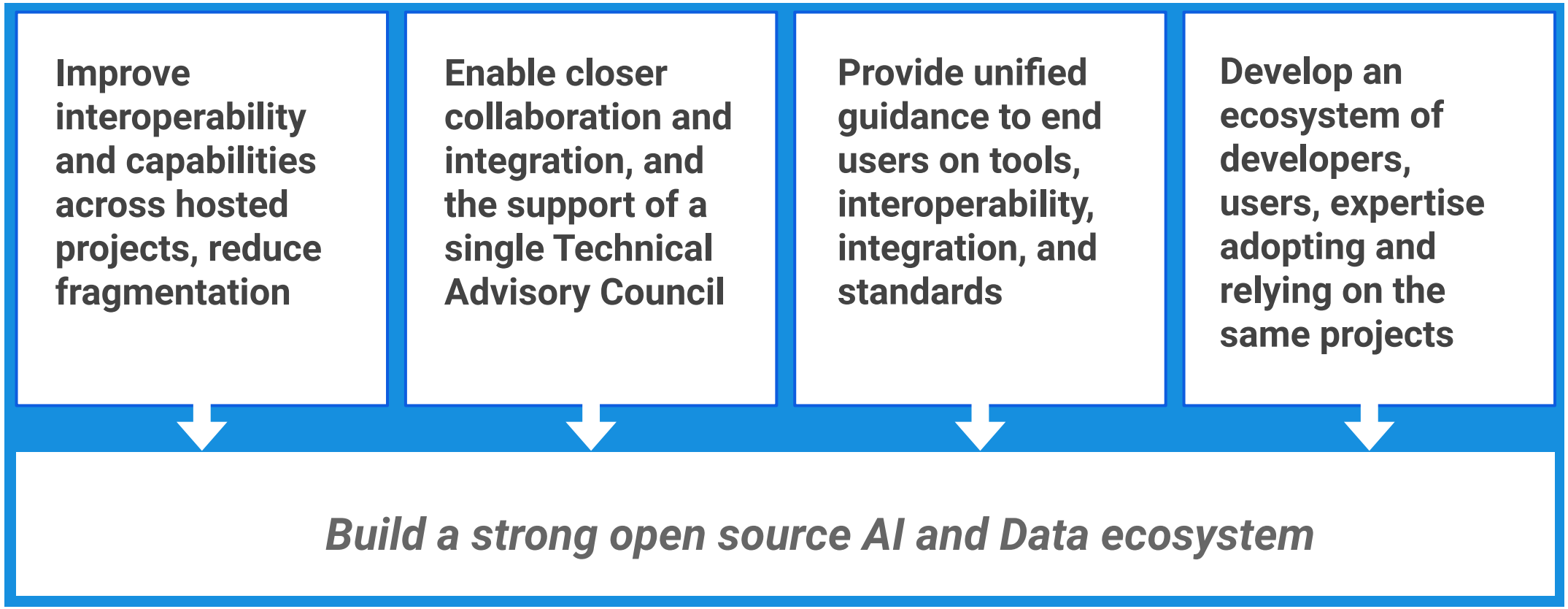
- Non-profit
- Open source collaborative effort focused on AI & Data
- Hosted at the Linux Foundation
- Focused on accelerating development innovation and a faster trajectory to adoption and growth

LF AI & Data

Collaborating to support an open and growing ecosystem of open source AI, data and analytics projects, by accelerating innovation, enabling collaboration and the creation of new opportunities for all the members of the community

https://lfaidata.foundation

Goals of LF AI & Data



LF AI & Data Growth

- Launched in 03/2018 with 9 members and 1 hosted project
- +3 projects in 2018
- +5 projects in 2019
- +15 projects, +16 members in 2020
- Currently supported by 46 member companies
- >2000 subscribers to our main mailing list

Very active and growing developer community

Jan 1- Dec 31, 2020

8.92K Contributors	217K Contributions	100.03K Commits	358 Repositories
6.93K Emails	34.65K PRs/Changesets	2.08K Slack messages	22.54K Total issues

Structure and Governance

Foundation Governance

Funding effort to support hosted technical projects

Governing Board

Committees

- Outreach
- Legal
- Strategy
- Budget

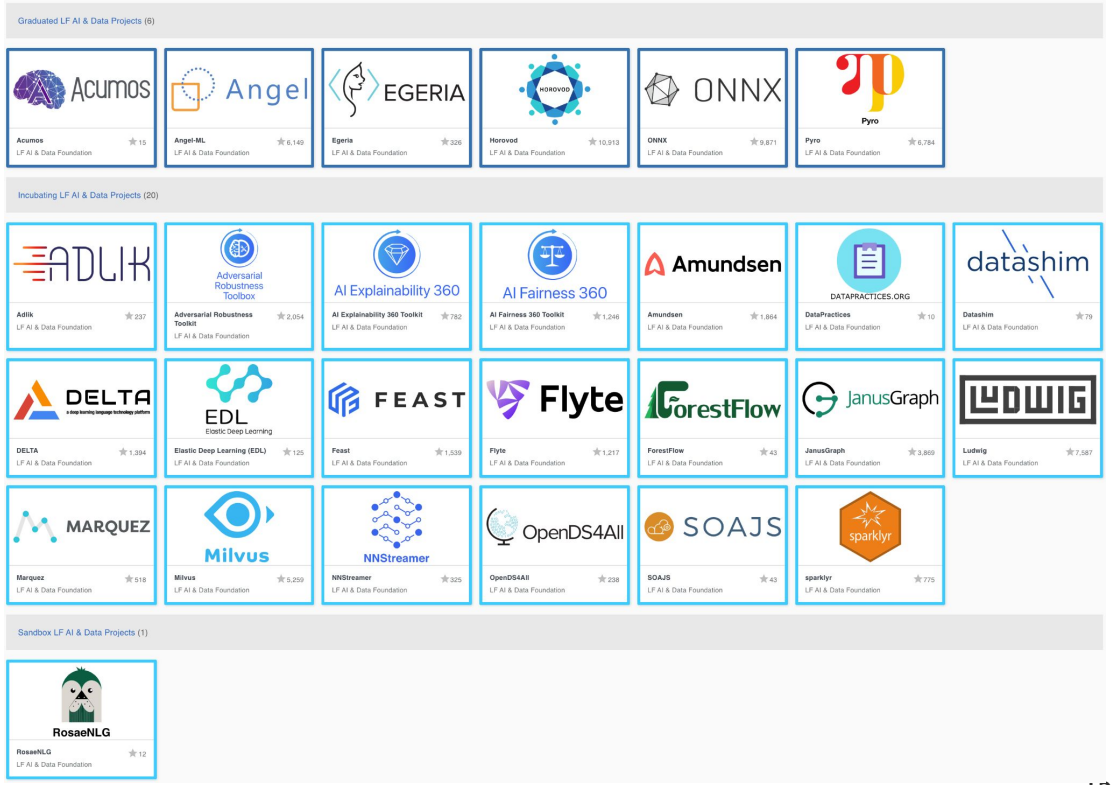
Technical Coordination

Technical Advisory Council

- ML Workflow & Interop
- Trusted AI
- BI & AI

Hosted Projects

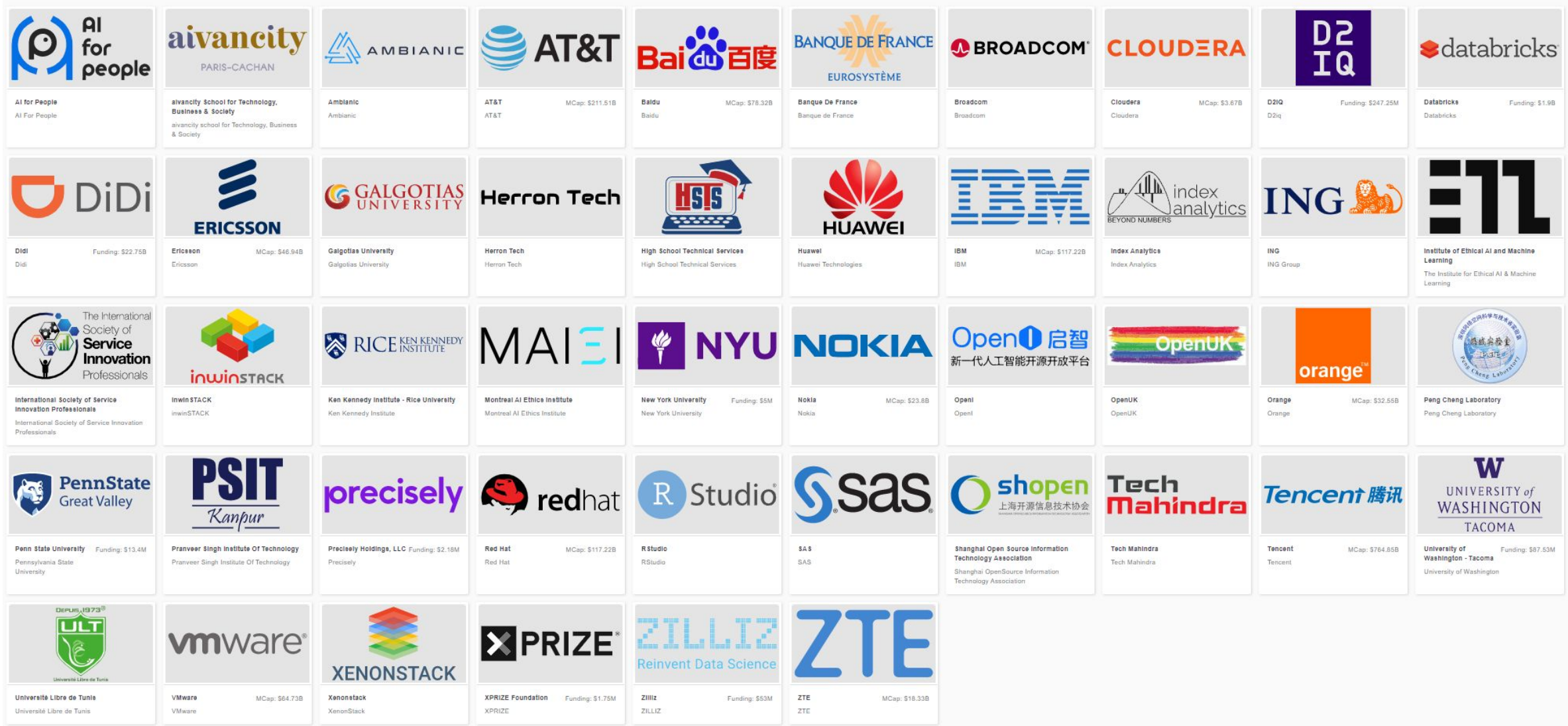
Projects have their own independent technical governance



LF AI & DATA

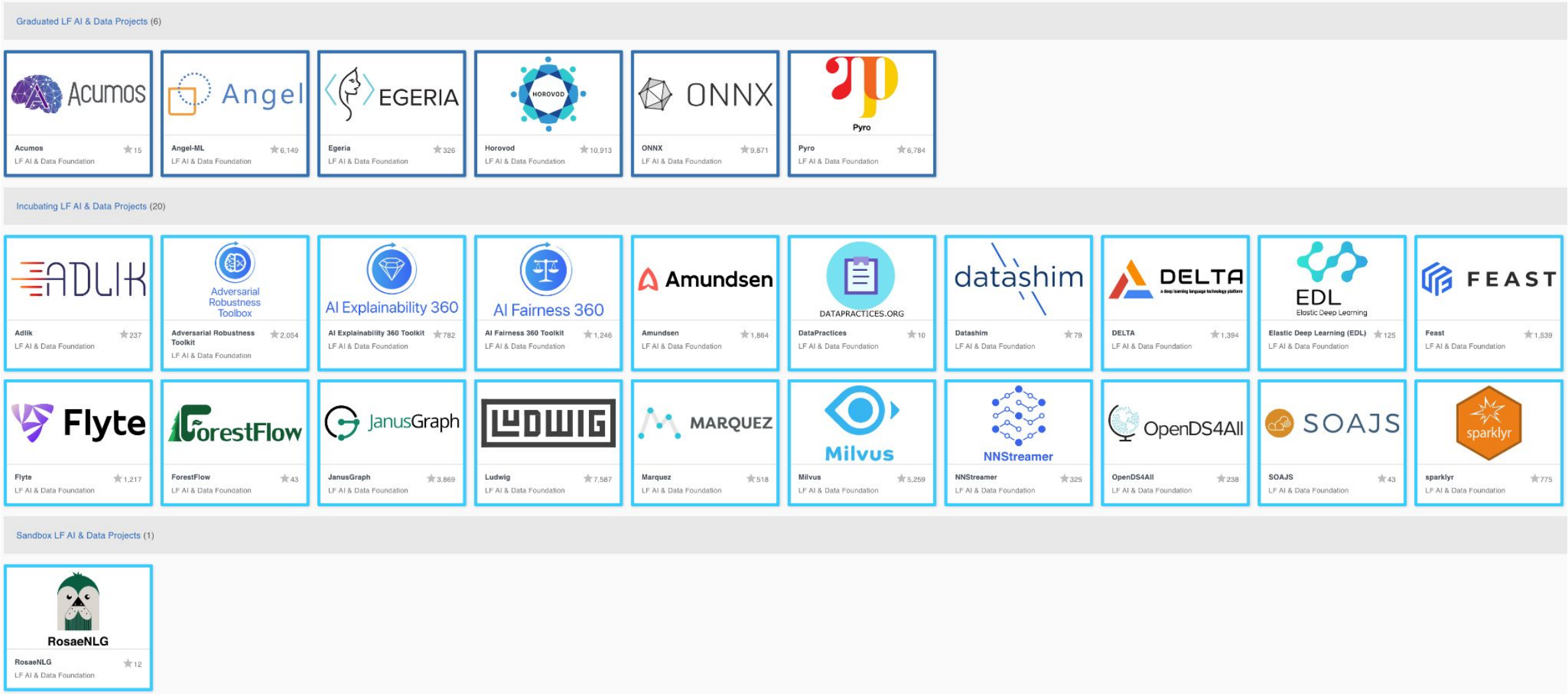
Members

https://landscape.lfai.foundation/card-mode?project=company



Projects (27)

https://landscape.lfai.foundation/card-mode?project=company




Framework
Platform
Library
Machine Learning
Angel
Graduated
ForestFlow
Incubating
Framework
Platform
Library
Tool
Deep Learning
Reinforcement Learning
Reinforcement Learning
Programming
Programming
Pyro
Graduated
Notebook Environment
Notebook Environment
Store & Format
Versioning
Operations
Feature Engineering
Stream Processing
SQL Engine
Visualization
Pipeline Management
Labeling & Annotation
Governance
Data
JanusGraph
Incubating
Milvus
Incubating
Amundsen
Incubating
datashim
Incubating
MARQUEZ
Incubating
FEAST
Incubating
NNStreamer
Incubating
EGERIA
Graduated
Inference
Benchmarking
Training
Parameter
Format & Interface
Marketplace
Workflow
Tool
Model
ADLIK
Incubating
Graduated
Incubating
ONNX
Graduated
Acumos
Graduated
Flyte
Incubating
Explainability
Adversarial
Bias & Fairness
Trusted & Responsible AI
AI Explainability 360
Incubating
Adversarial Robustness Toolbox
Incubating
AI Fairness 360
Incubating
Computing & Management
Interface
Distributed Computing
EDL
Incubating
SOAJS
Incubating
sparklyr
Incubating
l.lfaidata.foundation
The LF AI & Data landscape explores open source projects in Artificial Intelligence and Data and their respective sub-domains.
LF AI & DATA Landscape
LF AI & DATA
Security & Privacy
Security & Privacy
Natural Language Processing
Natural Language Processing
DELTA
Incubating
RosaeNLG
Sandbox
Education
Education
DATAPRACTICES.ORG
Incubating
OpenDS4All
Incubating

Acumos AI

Open source framework to build, share and deploy AI applications

Acumos is an open source platform, which supports design, integration and deployment of AI models. Furthermore, it offers an AI marketplace that empowers data scientists to publish adaptive AI models, while shielding them from the need to custom develop fully integrated solutions.

Learn More

Adlik

Open source toolkit for accelerating deep learning inference

Adlik is an end-to-end optimizing framework for deep learning models. The goal of Adlik is to accelerate deep learning inference process both on cloud and embedded environments.

Learn More

AI Explainability 360

Open source toolkit that can help users better understand the ways that machine learning models predict labels

AI Explainability 360 is an open source toolkit that can help users better understand the ways that machine learning models predict labels using a wide variety of techniques throughout the AI application lifecycle.

Learn More

AI Fairness 360

Open source toolkit that can help users understand and mitigate bias in machine learning models throughout the AI application lifecycle

AI Fairness 360 is an extensible open source toolkit that can help users understand and mitigate bias in machine learning models throughout the AI application lifecycle.

Learn More

Adversarial Robustness Toolbox

Open source tools to evaluate, defend, certify and verify Machine Learning models and applications against adversarial threats

Adversarial Robustness Toolbox (ART) provides tools that enable developers and researchers to evaluate, defend, certify and verify Machine Learning models and applications against the adversarial threats.

Learn More

Amundsen

Amundsen is a data discovery and metadata engine for improving the productivity of data analysts, data scientists and engineers when interacting with data

Amundsen is a data discovery and metadata engine for improving the productivity of data analysts, data scientists and engineers when interacting with data.

Learn More

Angel ML

Open source high-performance distributed machine learning platform

Angel is a high-performance distributed machine learning platform. It is tuned for performance with big data from Tencent and has a wide range of applicability and stability, demonstrating increasing advantage in handling higher dimension model.

Learn More

DataPractices

An effort to increase awareness and data literacy in the data ecosystem

DataPractices is a "Manifesto for Data Practices," comprised of values and principles to illustrate the most effective, modern, and ethical approach to data teamwork.

Learn More

Datashim

Open source enablement and acceleration of data access for Kubernetes/Openshift workloads in a transparent and declarative way

Datashim is enabling and accelerating data access for Kubernetes/Openshift workloads in a transparent and declarative way. Opensourced since September of 2019 and is growing to support use-cases related to data access in AI projects.

Learn More

Delta

DELTA is a deep learning based end-to-end natural language and speech processing platform

DELTA is a deep learning based end-to-end natural language and speech processing platform. DELTA aims to provide easy and fast experiences for using, deploying, and developing natural language processing and speech models for both academia and industry use cases. DELTA is mainly implemented using TensorFlow and Python 3.

Learn More

Elastic Deep Learning

Open source deep learning framework to build cluster cloud services

EDL optimizes the global utilization of the cluster running deep learning job and the waiting time of job submitters. It includes two parts: a Kubernetes controller for the elastic scheduling of distributed deep learning jobs, and a fault-tolerable deep learning framework.

Learn More

Egeria

The open standard that simplifies sharing and exchanging metadata.

Egeria is the world's first open source metadata standard. It provides open APIs, event formats, types and integration logic so organizations can share data management and governance across the entire enterprise without reformatting or restricting the data to a single format, platform, or vendor product.

Learn More

FEAST

Open source feature store for machine learning

Feast is an open source feature store for machine learning. It was developed as a collaboration between Gojek and Google in 2018. Feast aims to:
– Provide scalable and performant access to feature data for ML models during training or serving.
– Provide a consistent view of features for both training and serving.
– Enable re-use of features through discovery, documentation, and metadata tracking.
– Ensures model performance by tracking, validating, and monitoring features in production.

Learn More

Flyte

Open source acceleration for machine learning and data workflows to production

Flyte is a production-grade, declarative, structured and highly scalable cloud-native workflow orchestration platform. It allows users to describe their ML/Data pipelines using Python, Java or (in the future other languages) and Flyte manages the data flow, parallelization, scaling and orchestration of these pipelines. Flyte builds on top of Docker containers and kubernetes.

Learn More

ForestFlow

An open source scalable policy-based cloud-native machine learning model server

ForestFlow is a scalable policy-based cloud-native machine learning model server. ForestFlow strives to strike a balance between the flexibility it offers data scientists and the adoption of standards while reducing friction between Data Science, Engineering and Operations teams.

Learn More

Horovod

Open source distributed training framework for TensorFlow, Keras and PyTorch

Horovod, a distributed training framework for TensorFlow, Keras and PyTorch, improves speed, scale and resource allocation in machine learning training activities. Uber uses Horovod for self-driving vehicles, fraud detection, and trip forecasting. It is also being used by Alibaba, Amazon and NVIDIA.

Learn More

JanusGraph

Distributed, open source, massively scalable graph database

JanusGraph is a scalable graph database optimized for storing and querying graphs containing hundreds of billions of vertices and edges distributed across a multi-machine cluster.

Learn More

Ludwig

Ludwig is a toolbox built on top of TensorFlow that allows to train and test deep learning models without the need to write code

Ludwig is a toolbox built on top of TensorFlow that allows to train and test deep learning models without the need to write code. All you need to provide is your data, a list of fields to use as inputs, and a list of fields to use as outputs, Ludwig will do the rest. Simple commands can be used to train models both locally and in a distributed way, and to use them to predict on new data.

Learn More

Marquez

Open source metadata service for the collection, aggregation, and visualization of a data ecosystem's metadata

Marquez is an open source metadata service for the collection, aggregation, and visualization of a data ecosystem's metadata. It maintains the provenance of how datasets are consumed and produced, provides global visibility into job runtime and frequency of dataset access, centralization of dataset lifecycle management, and much more.

Learn More

Milvus

Open source similarity search engine for massive-scale feature vectors

Milvus is built with heterogeneous computing architecture for the best cost efficiency. Milvus can be used in a wide variety of scenarios to boost AI application development.

Learn More

NNStreamer

Gstreamer plugins supporting ease and efficiency with neural network models and pipelines

NNStreamer is a set of Gstreamer plugins that support ease and efficiency for Gstreamer developers adopting neural network models and neural network developers managing neural network pipelines and their filters.

Learn More

ONNX

Open source format to represent deep learning models

With ONNX, AI developers can more easily move models between state-of-the-art tools and choose the combination that is best for them.

Learn More

OpenDS4All

Enables the creation of educational Data Science programs.

OpenDS4All is an open source project built to accelerate the creation of data science curricula at academic institutions.

Learn More

Pyro

Open source universal probabilistic programming language

Pyro is a universal probabilistic programming language (PPL) written in Python and supported by PyTorch on the backend. Pyro enables flexible and expressive deep probabilistic modeling, unifying the best of modern deep learning and Bayesian modeling.

Learn More

SOAJS

Open source microservices and API management platform

SOAJS is an open source microservices and API management platform, SOAJS eliminates the IT plumbing challenges, so you can deploy microservices significantly earlier and faster. IT initiatives such as digital transformation are simplified, accelerated, cost reduced, and risk mitigated. Our fully integrated, world-class API lifecycle management, multi-cloud orchestration, release management, and IT Ops automation capabilities eliminate your IT organization's modernization pain.

Learn More

Sparklyr

Open source and modern interface to scale data science and machine learning workflows using Apache Spark™, R, and a rich extension ecosystem

sparklyr is an open-source and modern interface to scale data science and machine learning workflows using Apache Spark™, R, and a rich extension ecosystem. It enables using Apache Spark with ease using R by providing access to core functionality like installing, connecting and managing Spark and using Spark's MLlib, Spark Structured Streaming and Spark Pipelines from R.

Learn More

Companies hosting projects in LF AI & Data

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

Incubating Projects

- 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

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 & Data Technical Advisory Committee** (TAC) is an independent signal of the quality of your project
- **Open and neutral governance model**
- **Program and project management services**
- **Access to full-time 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** including China and Japan

Strong Marketing/PR/Community Effort

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

37 announcements in 2019

61 announcements in 2020

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

LF AI provides event and community ecosystem building services.

LF AI Summit
Co-located with the Open Source Summit EU

LF AI DAY
ONNX COMMUNITY VIRTUAL MEETUP

Joining LF AI & Data is Easy!

General Inquiries:

info@lfaidata.foundation

LF AI & DATA

Backup

LF AI & DATA

Why incubate with us?

Building large, sustainable ecosystems requires collective resources

Events - We gathered over 45,000 attendees from over 12,000 organizations across 113 countries in 2019.

Legal - We manage IP for the world's most important tech and have one of the world's top open source legal teams in house.

Training - We trained millions of students (free and paid online), online skills certification, and on-site e-learning.

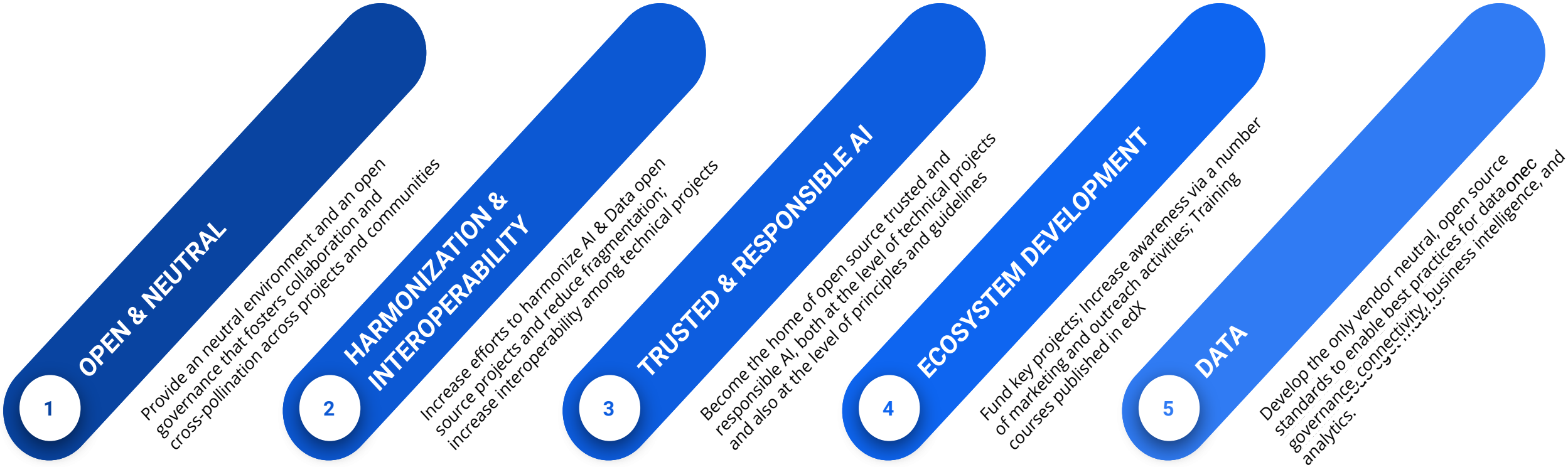
Certification - We designed and executed software and hardware testing and certification programs.

Developer Marketing - We have the largest share of voice of any open source foundation and a proven method to build large scale developer programs.

Developer Operations - We host the infrastructure that develops the world's largest software communities and provide release management, IT ops, and support.

Application Security- our projects are regularly audited and pen tested. We offer bug bounties, dependency analysis, and code scanning.

Why is LF AI & Data important?



LF AI TIMELINE 2018-2019

MARCH 2018

- LF DEEP LEARNING LAUNCH
- Acumos AI

MAY 2018

- ACUMOS AI CHALLENGE

JUNE 2018

- PROJECT CONTRIBUTION PROCESS & LIFECYCLE DOCUMENT

JULY 2018

- ACUMOS AI DAY FRANCE

AUGUST 2018

- Angel
- EDL Elastic Deep Learning

NOVEMBER 2018

- ACUMOS AI DAY NYC
- ACUMOS "ATHENA" RELEASE

DECEMBER 2018

- Horovod
- LF AI Landscape LAUNCH

JANUARY 2019

- pytorch

FEBRUARY 2019

- GETTING INVOLVED GUIDE

MARCH 2019

- LF AI MISSION & GOALS

MAY 2019

- LF AI REBRAND

AUGUST 2019

- ML WORKFLOW COMMITTEE
- ACUMOS & IBM FAIRNESS 360 INTEGRATION
- LF AI TRACK OSS NA
- LF AI MEETING SAN DIEGO

SEPTEMBER 2019

- PROJECT CONTRIBUTION PROCESS & LIFECYCLE DOCUMENT UPDATE

OCTOBER 2019

- TRUSTED AI COMMITTEE
- LF AI SUMMIT EU
- ADLIK
- ANGEL MEETUP SHENZHEN
- ONNX
- LF AI DAY PARIS
- LF AI DAY SHANGHAI

NOVEMBER 2019

- ONNX COMMUNITY MEETING
- KUBECON SHANGHAI

DECEMBER 2019

- sparklyr
- MARQUEZ
- ANGEL GRADUATION

TECHNICAL PROJECTS · FOUNDATION · COMMUNITY

INFO@LFAI.FOUNDATION

LF AI & DATA TIMELINE 2020-2021

JANUARY 2020

- Milvus

MARCH 2020

- ForestFlow

APRIL 2020

- NNStreamer
- ONNX COMMUNITY VIRTUAL MEETUP

MAY 2020

- LUDWIG

JUNE 2020

- AI Fairness 360
- AI Explainability 360
- Adversarial Robustness Toolbox
- VIRTUAL LF AI DAY EU
- OSS NA + AI/ML/DL TRACK

JULY 2020

- CLOUD NATIVE + OPEN SOURCE VIRTUAL SUMMIT CHINA 2020
- Amundsen

SEPTEMBER 2020

- SOAJS
- DELTA
- FEAST
- EGERIA
- OpenDS4All
- GRADUATION
- OPEN NETWORKING & EDGE SUMMIT

OCTOBER 2020

- LF AI DAY ONNX COMMUNITY VIRTUAL MEETUP
- RELAUNCHING AS LF AI & DATA WITH INCREASED DATA FOCUS
- LF AI & DATA FOUNDATION LAUNCH
- OSS EU + AI/ML/DL TRACK

NOVEMBER 2020

- LF AI & DATA DAY SHENZHEN

DECEMBER 2020

- DATAPRACTICES.ORG

JANUARY 2021

- JanusGraph

FEBRUARY 2021

- GRADUATION
- Flyte

INFO@LFAI.FOUNDATION

TECHNICAL PROJECTS | FOUNDATION | COMMUNITY