

IESTI01 - TinyML

AI Lifecycle and ML Workflow

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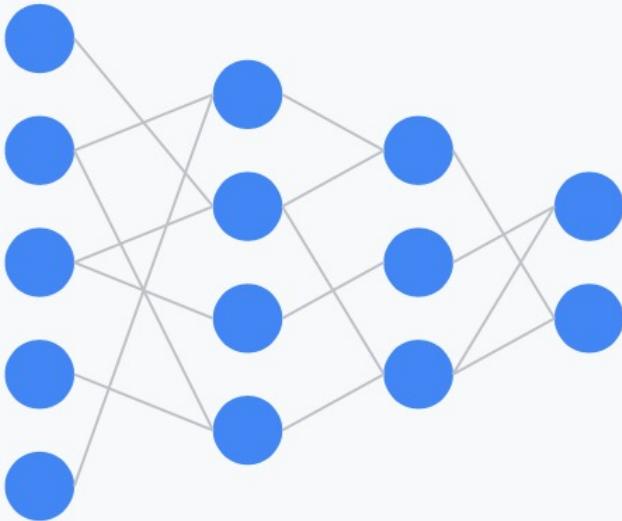
June 9th, 2021



ML Lifecycle

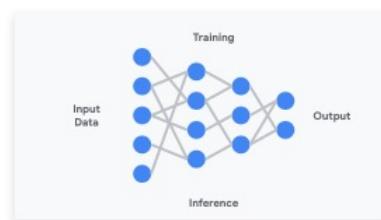
**Input
Data**

Training



Output

Inference



ML Code

**Data
Collection**

**Data
Preprocessing**

Debugging

**Resource
Management**

Configuration

**Data
Verification**

ML Code

Model Analysis

**Serving
Infrastructure**

Automation

Feature Engineering

**Process
Management**

Monitoring

Metadata Management

AI Infrastructure

Data Engineering

Model Engineering

Model Deployment

Product Analytics

Data Engineering

- Defining data **requirements**
- **Collecting** data
- **Labelling** the data
- Inspect and **clean** the data
- Prepare data for **training**
- **Augment** the data
- Add **more data**

AI Infrastructure

Data Engineering

Data Engineering

- Defining data **requirements**
- **Collecting** data
- **Labelling** the data
- Inspect and **clean** the data
- Prepare data for **training**
- **Augment** the data
- **Add more data**

AI Infrastructure

Data Engineering

Model Engineering

- **Training** ML models
- Improving training **speed**
- Setting **target** metrics
- **Evaluating** against metrics
- **Optimizing** model training
- Keeping up with **SOTA**

AI Infrastructure

Data Engineering

Model Engineering

Model Deployment

- Model **conversion**
- **Performance** optimization
- **Energy-aware** optimizations
- **Security** and **privacy**
- **Inference** serving APIs
- **On-device** fine-tuning

AI Infrastructure

Data Engineering

Model Engineering

Model Deployment

Product Analysis

- Dashboards
- Field data evaluation
- Value-added for business
- Opportunities for advancement and improvements

AI Infrastructure

Data Engineering

Model Engineering

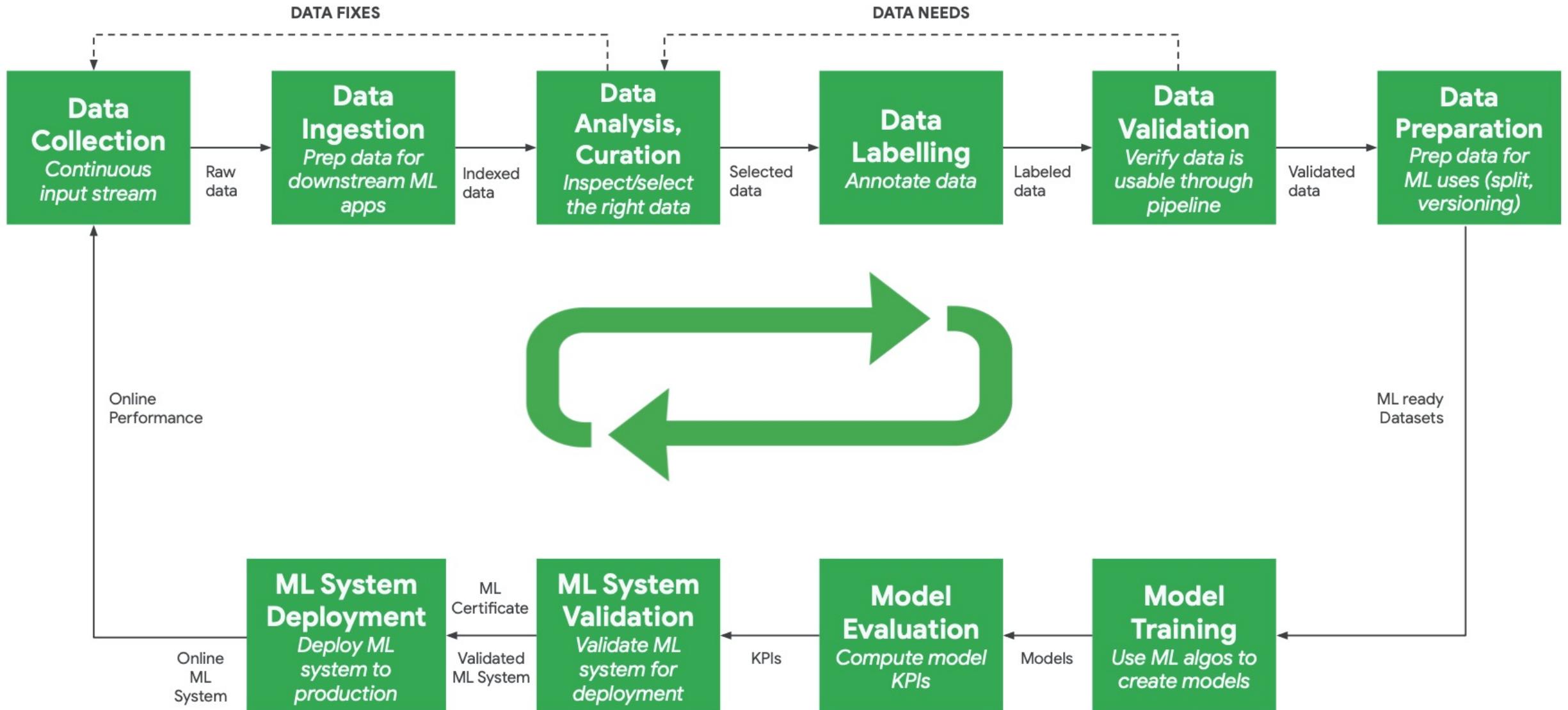
Model Deployment

Product Analytics

Focus in TinyML



Life cycle of ML



ML Workflow

AI Infrastructure

Data Engineering

Model Engineering

Model Deployment

Product Analytics

Acoustic Sensors
Ultrasonic, Microphones,
Geophones, Vibrometers



Image Sensors
Thermal, Image



Motion Sensors
Gyroscope, Radar,
Accelerometer



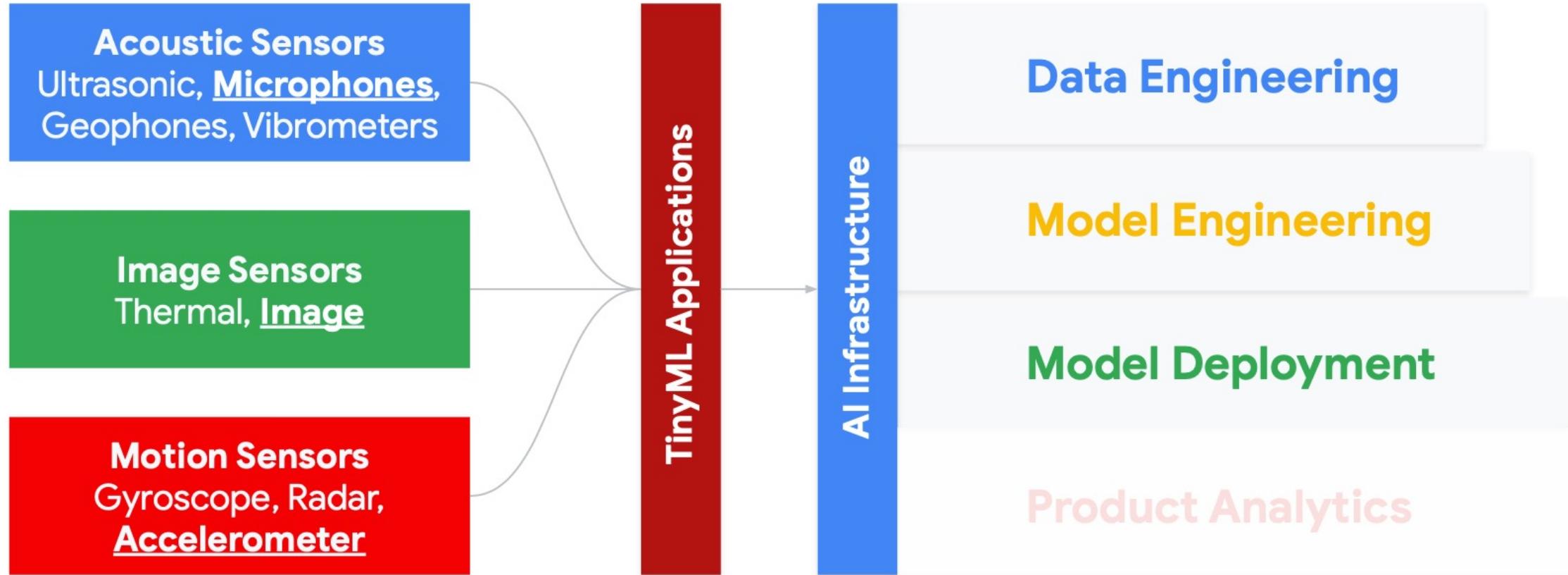
AI Infrastructure

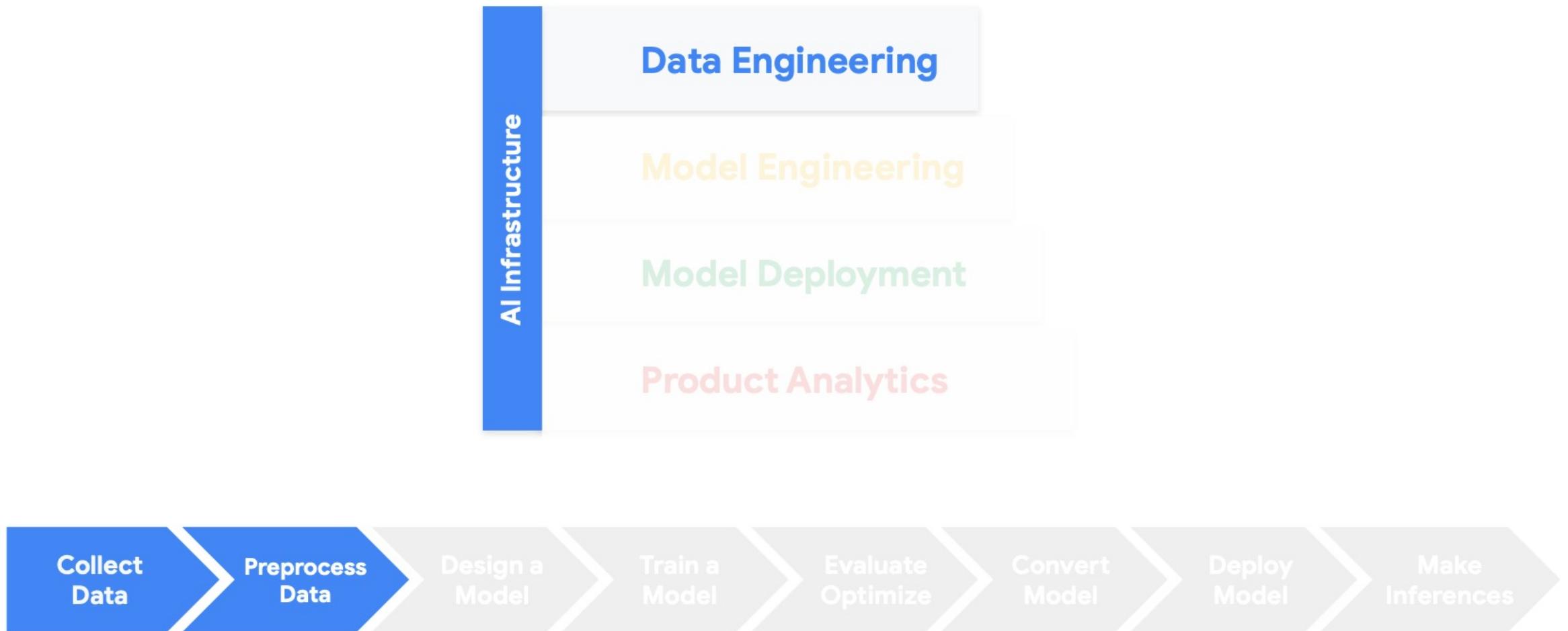
Data Engineering

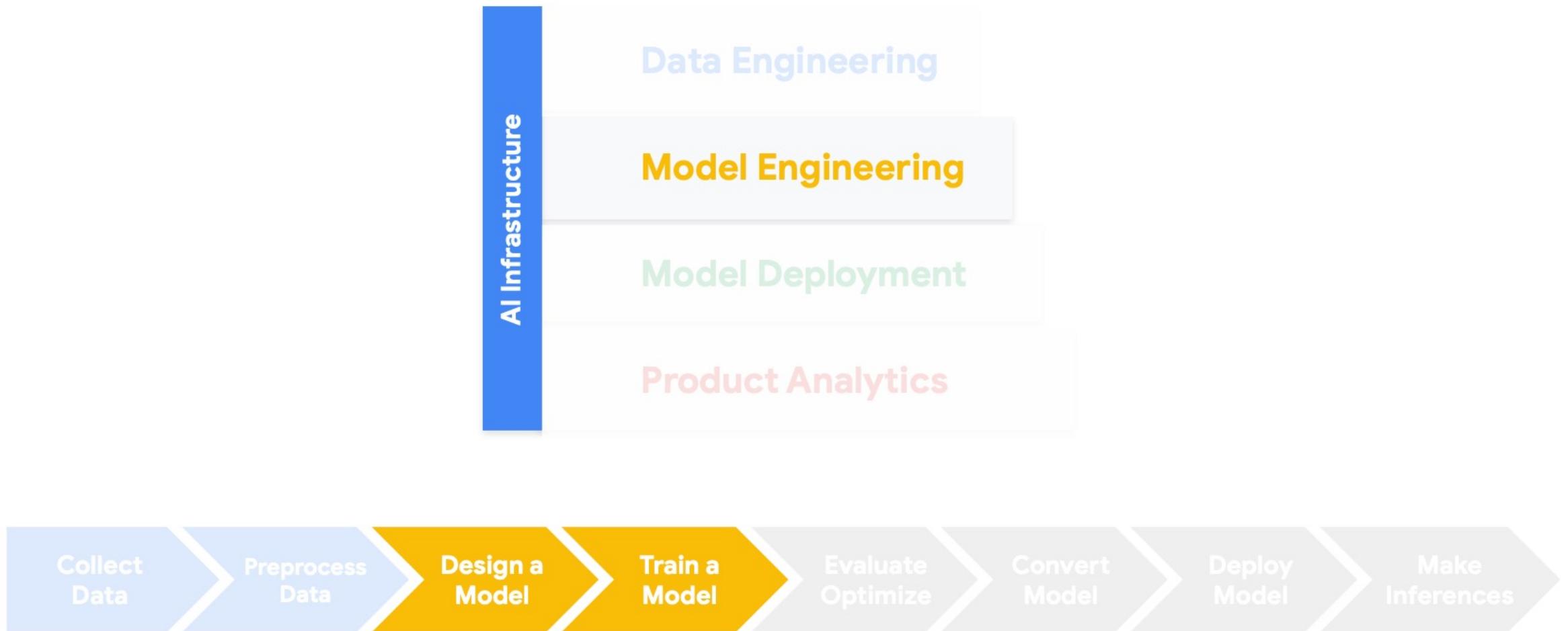
Model Engineering

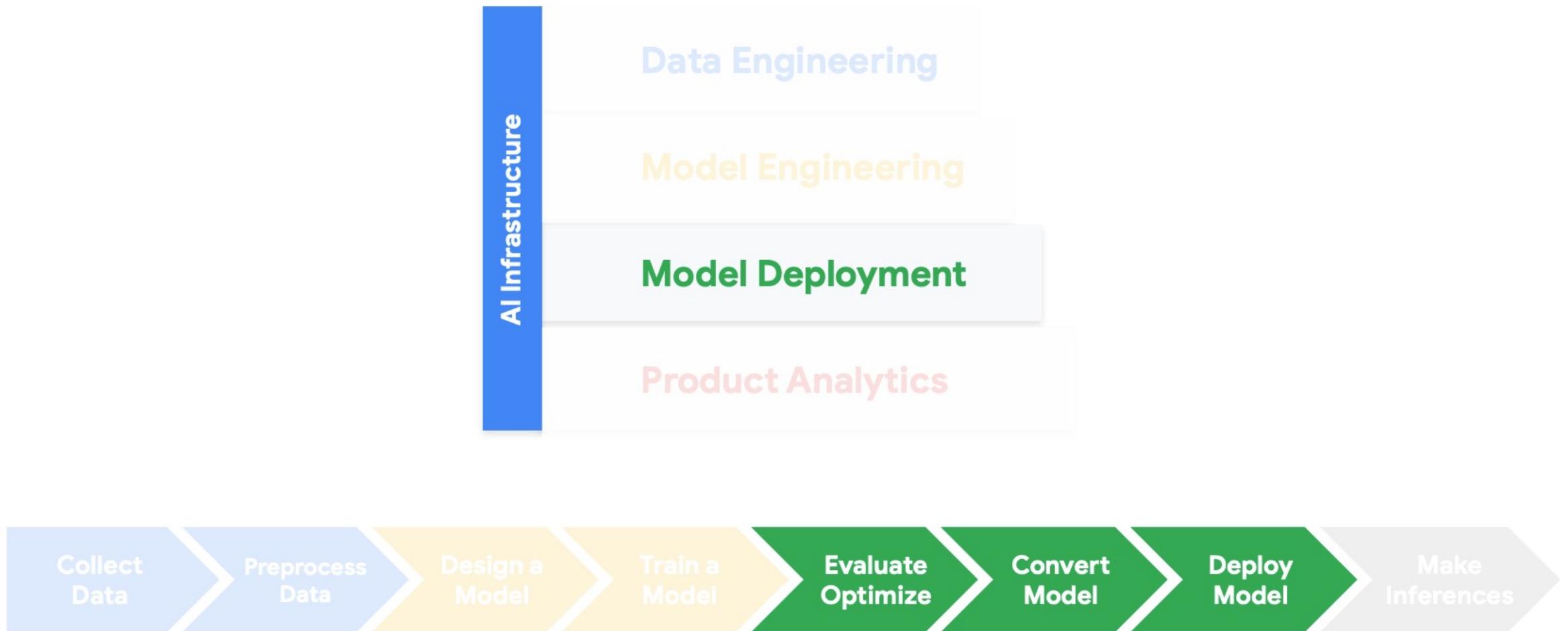
Model Deployment

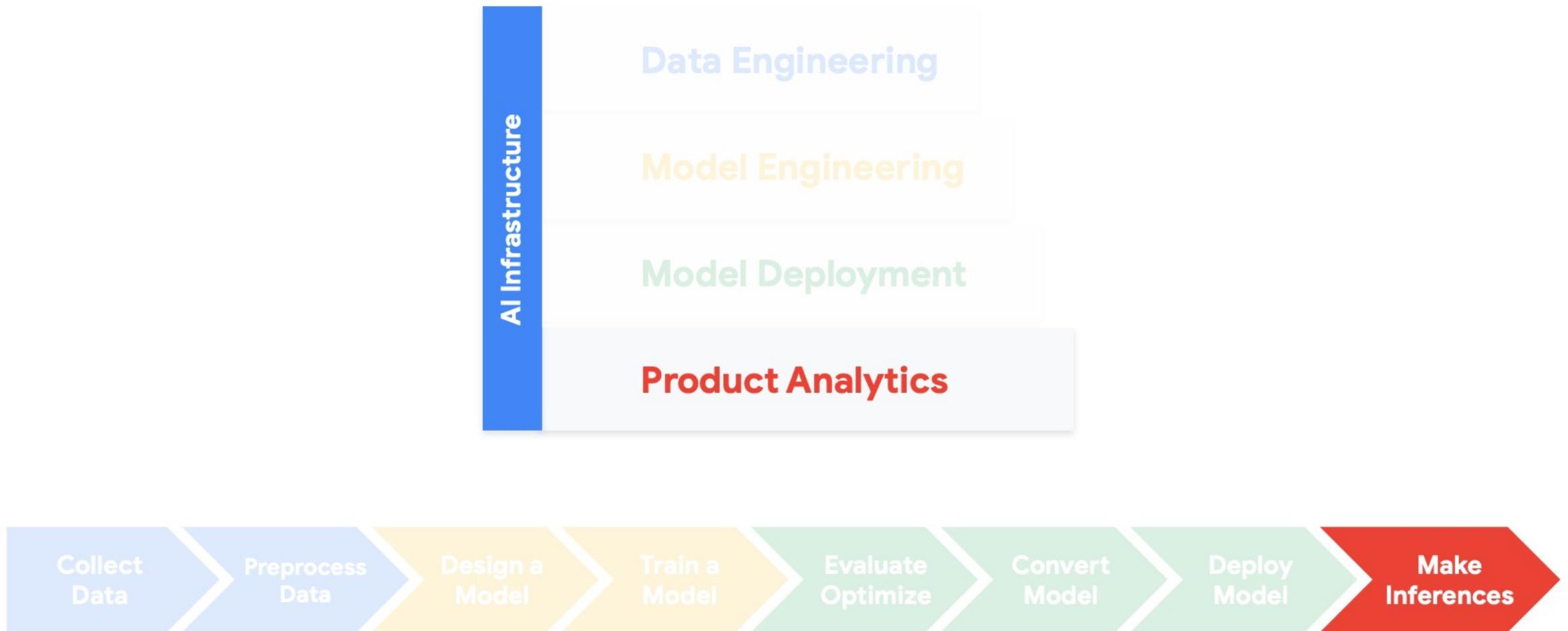
Product Analytics

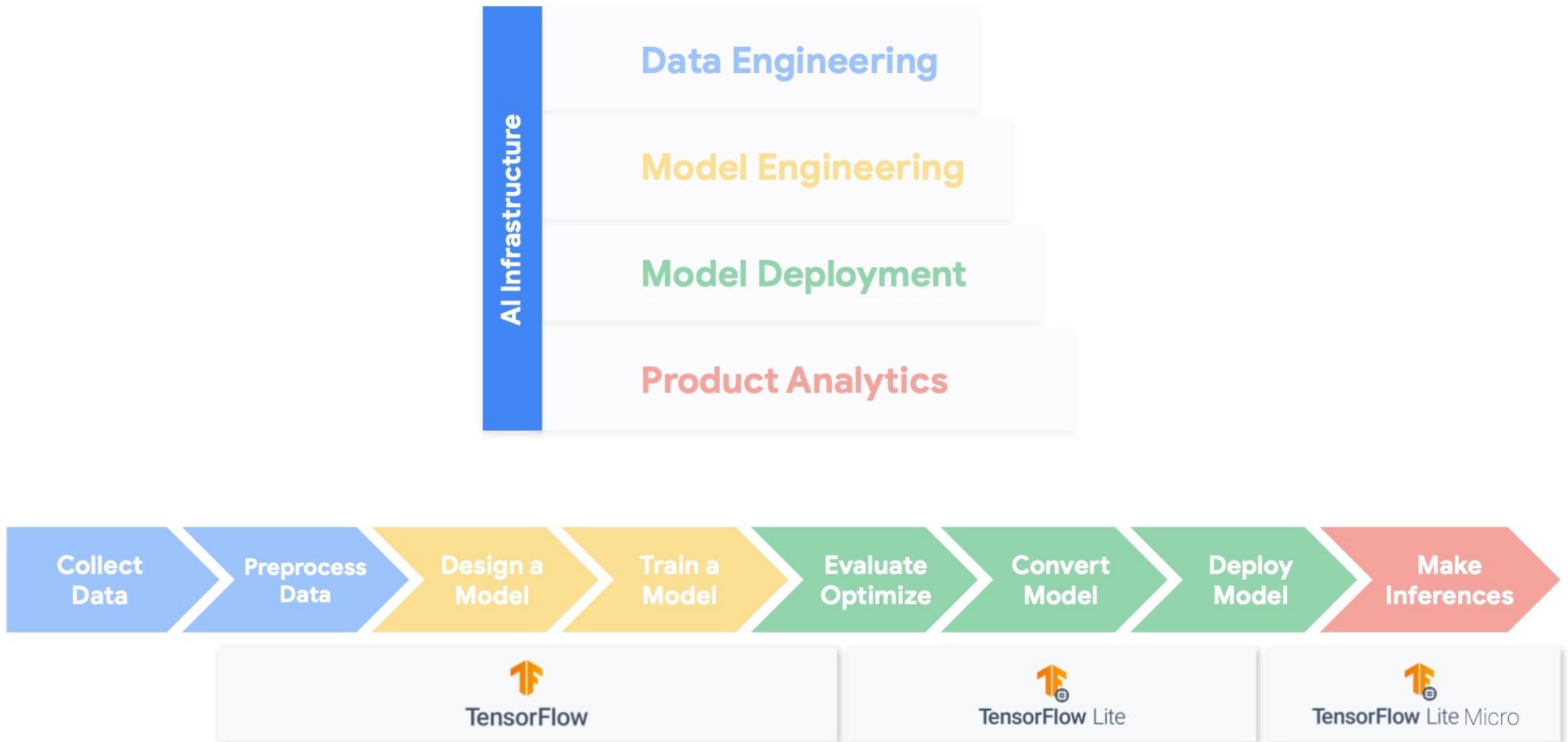


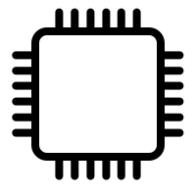
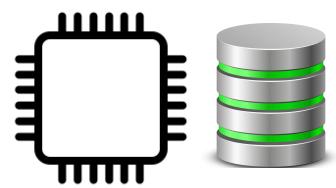












Data Engineering

Collect Data

Preprocess Data

Design a Model

Train a Model

Evaluate Optimize

Convert Model

Deploy Model

Make Inferences



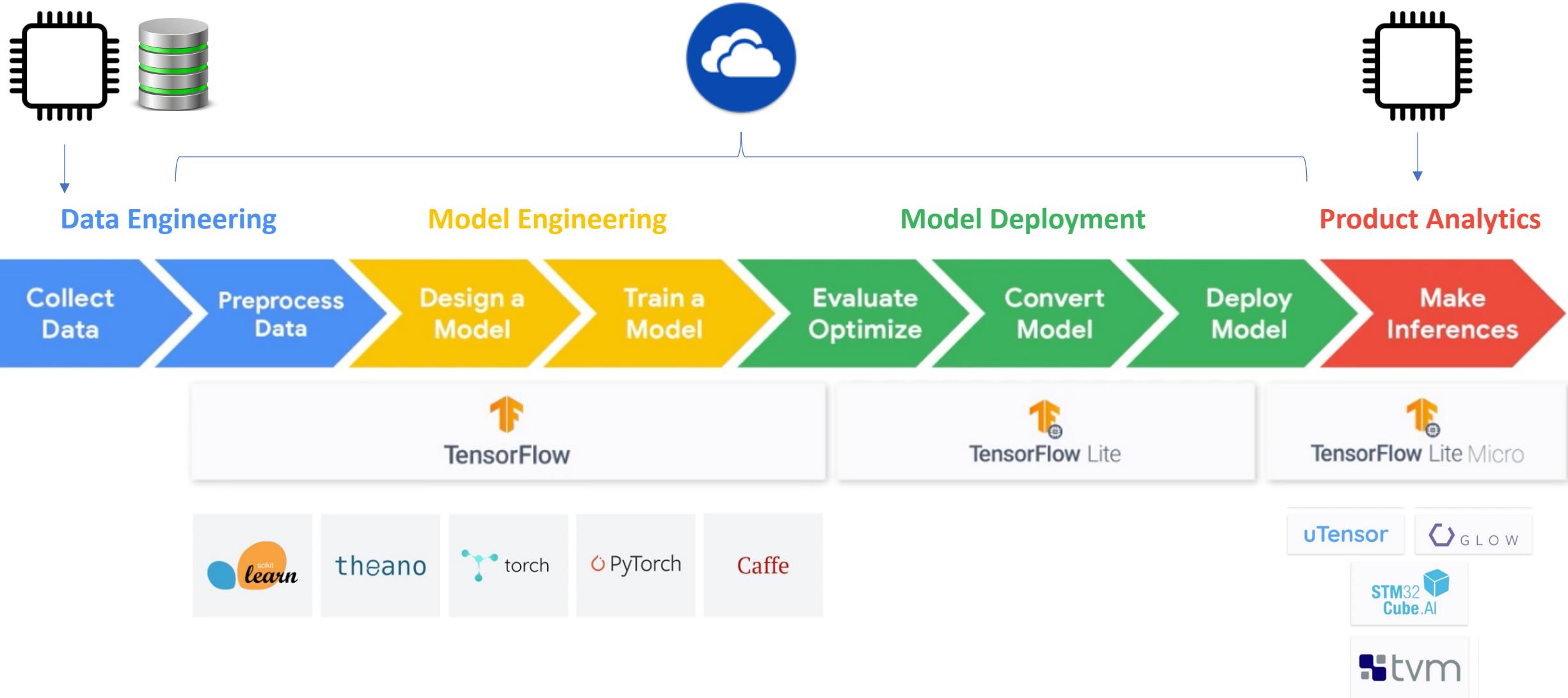
TensorFlow



TensorFlow Lite



TensorFlow Lite Micro



Reading Material

Main references

- [Harvard School of Engineering and Applied Sciences - CS249r: Tiny Machine Learning](#)
- [Professional Certificate in Tiny Machine Learning \(TinyML\) – edX/Harvard](#)
- [Introduction to Embedded Machine Learning \(Coursera\)](#)
- [Text Book: "TinyML" by Pete Warden, Daniel Situnayake](#)

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The IESTI01 course is part of the [TinyML4D](#), an initiative to make TinyML education available to everyone globally.

Thanks
And stay safe!

