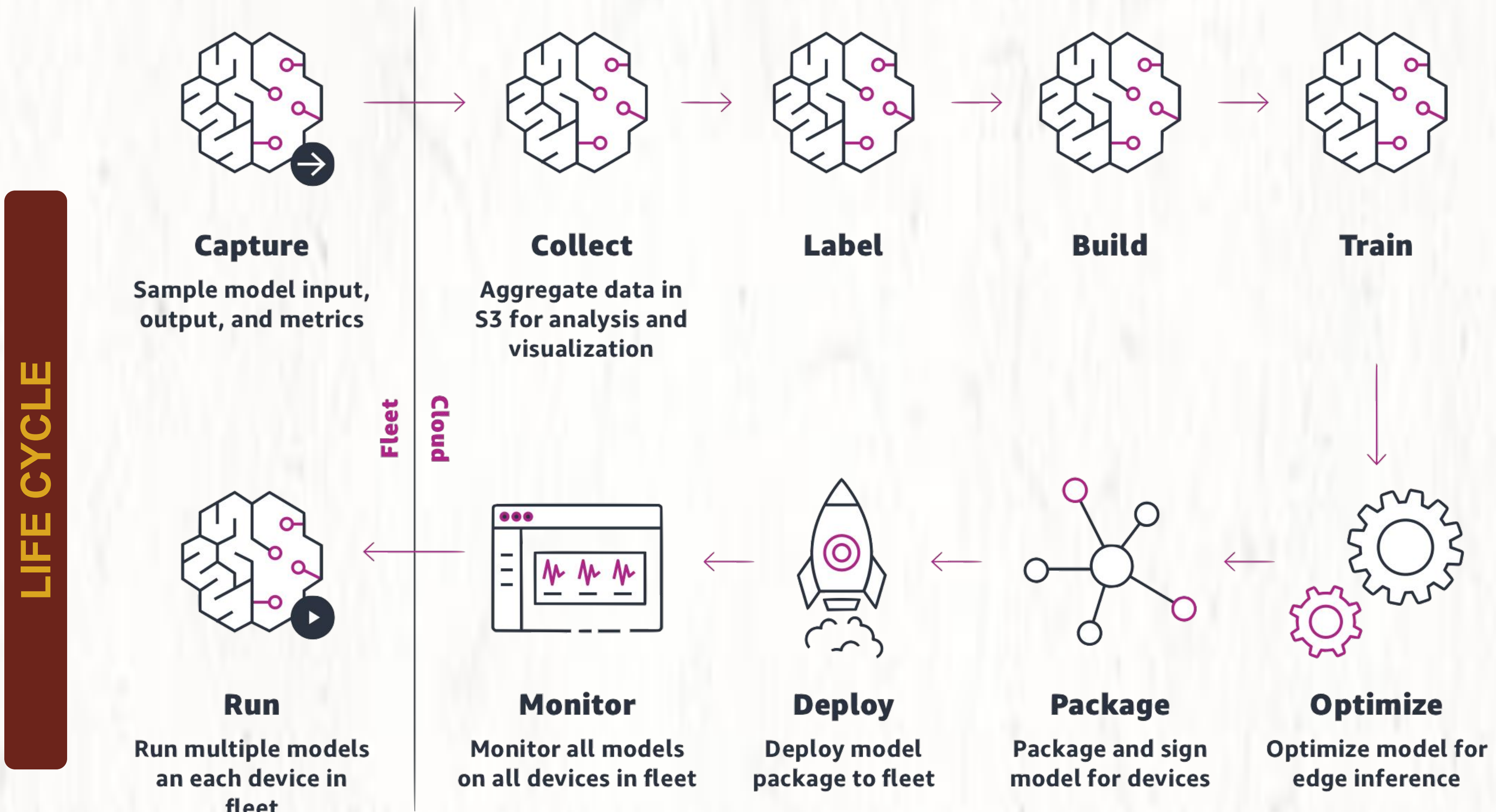


MLOps – Amazon Web Services (AWS)



Source:

- https://startup-resources.awscloud.com/campaign-assets-machine-learning/mlops-emerging-trends-in-data-code-and-infrastructure



		People	Data	Train	Deploy
MATURITY LEVEL	Initial	<ul style="list-style-type: none">Disconnected data science & IT teamsLimited cross-training	<ul style="list-style-type: none">Ad-hoc data collection and preparation	<ul style="list-style-type: none">Manual training & retrainingNo clear path to deployment	<ul style="list-style-type: none">Manual deployment
	Repeatable	<ul style="list-style-type: none">Improved collaboration with stakeholdersShared project goals	<ul style="list-style-type: none">Automated data pipelines	<ul style="list-style-type: none">Defined path for experimentationAutomated training pipelinesManual Model Validation	<ul style="list-style-type: none">Automated deployment pipelinesLimited monitoring measuring
	Reliable	<ul style="list-style-type: none">Cross-functional project teamsCross-training	<ul style="list-style-type: none">Automated ML PipelinesData Governance	<ul style="list-style-type: none">Experiment ManagementAutomated ML PipelinesModel GovernanceAutomated Model Validation	<ul style="list-style-type: none">Automated MLPipelinesMonitoring & Logging (Model, Workload, Pipeline)
	Scalable	<ul style="list-style-type: none">Cross-functional project teamsCross-training	<ul style="list-style-type: none">CI/CDPolicy-as-CodeConfiguration-as CodeAutomated Validation	<ul style="list-style-type: none">CI/CDPolicy/Config-as-CodeAutomated Model ValidationAutomated Integration Validation	<ul style="list-style-type: none">CI/CDPolicy/Infra/Config-as CodeModel MonitoringDashboard & Transparency

MLOps – Google Cloud Platform (GCP)



Sources:

- <https://cloud.google.com/resources/mlops-whitepaper>
- <https://cloud.google.com/architecture/mlops-continuous-delivery-and-automation-pipelines-in-machine-learning>

LIFE CYCLE



MATURITY LEVEL

Level 0: Manual Process

- Manual, script-driven, and interactive process
- Disconnection between ML and operations
- Infrequent release iterations
- No CI, No CD
- Prediction service deployment
- No monitoring

Level 1: ML Pipeline Automation

- Rapid experiment
- Continuous Training of the model in production
- Experimental-operational symmetry
- Modularized code for components and pipelines
- Continuous delivery of models
- Training Pipeline deployment

Level 2: CI/CD Pipeline Automation

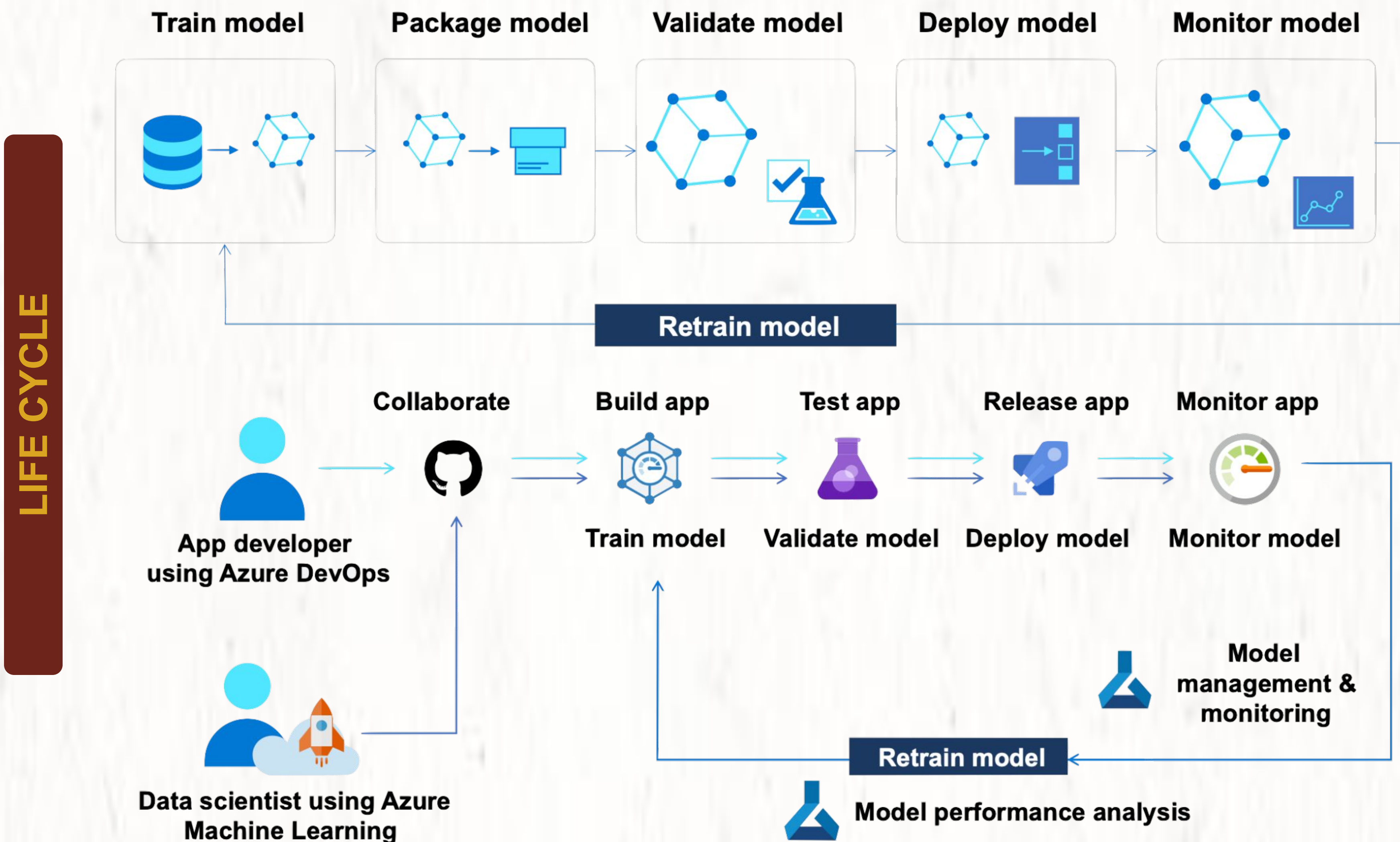
- Development and experimentation
- Continuous Integration of pipeline
- Continuous Delivery of pipeline
- Automated triggering of model retraining
- Continuous Delivery of model
- Monitoring

MLOps – Microsoft Azure



Sources:

- <https://azure.microsoft.com/resources/mlops-with-azureml/>
- <https://docs.microsoft.com/en-us/azure/architecture/example-scenario/mlops/mlops-maturity-model>



MATURITY LEVEL

	1 DevOps, No MLOps	2 Automated Training	3 Automated Model Deployment	4 Full MLOps Automated Retraining
Training	Untracked, file is provided for handoff	Tracked, run results and model artifacts are captured in a repeatable way	Tracked, run results and model artifacts are captured in a repeatable way	Tracked, run results and model artifacts are captured in a repeatable way, retraining set up based on metrics from app
Release	Manual, hand-off	Manual release, clean handoff process, managed by SWE team	Automated, CI/CD pipeline set up, everything is version controlled	Automated, CI/CD pipeline set up, everything is version controlled, A/B testing has been added
Integration	Manual, heavily DS driven	Manual, heavily DS driven, basic integration tests added	Semi-automated, unit and integration test added, still needs human signoff	Semi-automated, unit and integration test added, may need human signoff
People	Siloed	Mix of siloed and cooperative	Mostly cooperative with some siloing	Fully cooperative