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# MLOps, Kubeflow, and Tekton



KubeCon

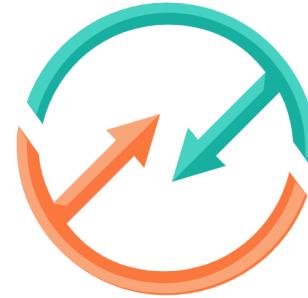


CloudNativeCon

North America 2019



**IBM Cloud**



**DevOps Pipeline**



**TEKTON**



**IBM Watson**



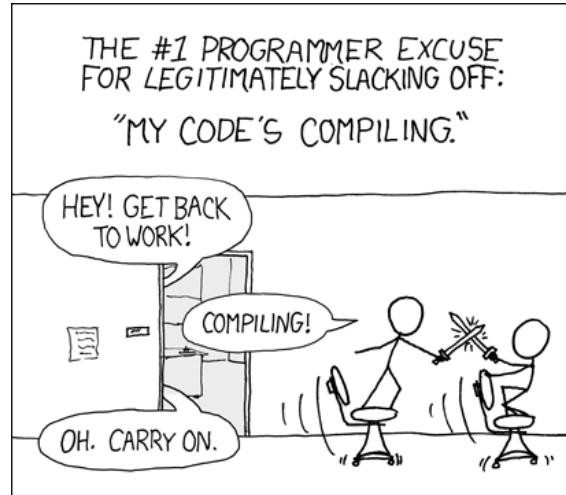
**Kubeflow**



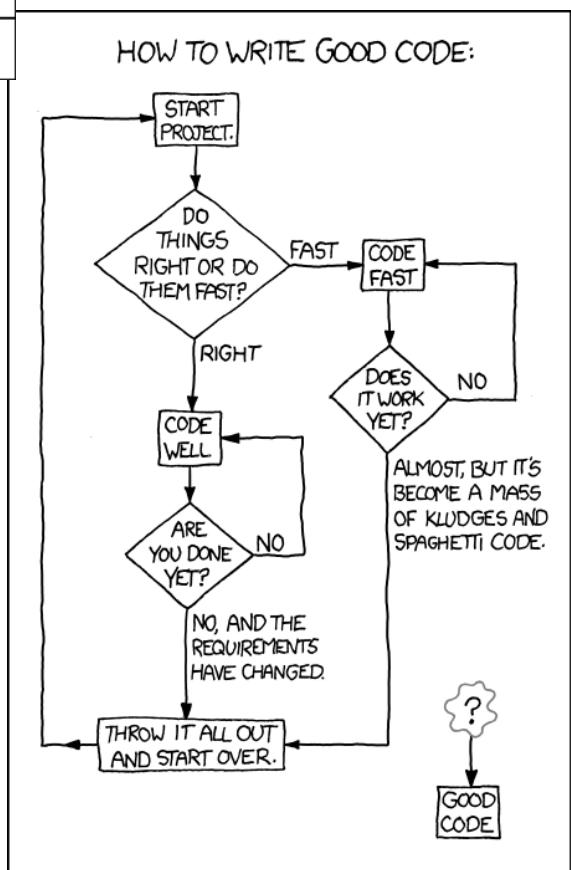
# DevOps vs MLOps

(\*or is it MLOps vs DevOps)



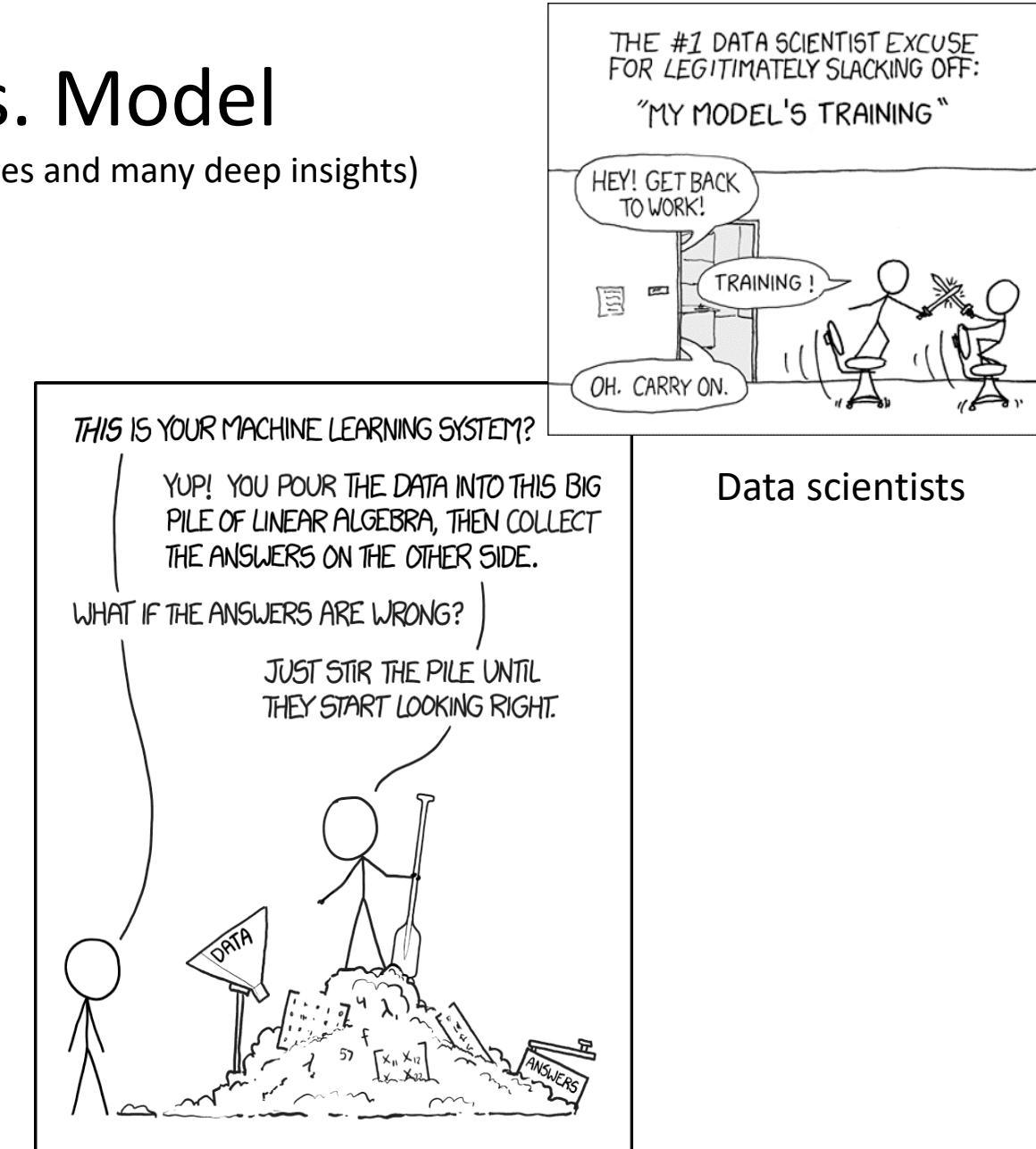


Software engineers



# Code vs. Model

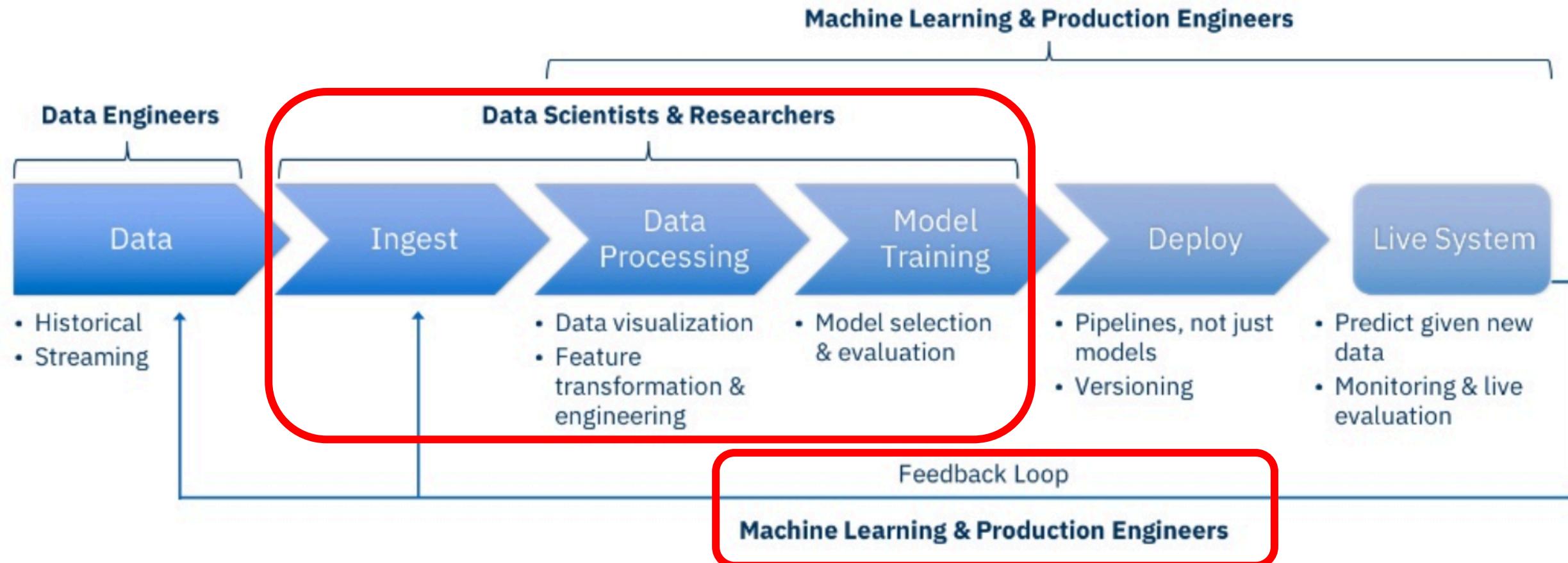
(\*thanks to XKCD for images and many deep insights)

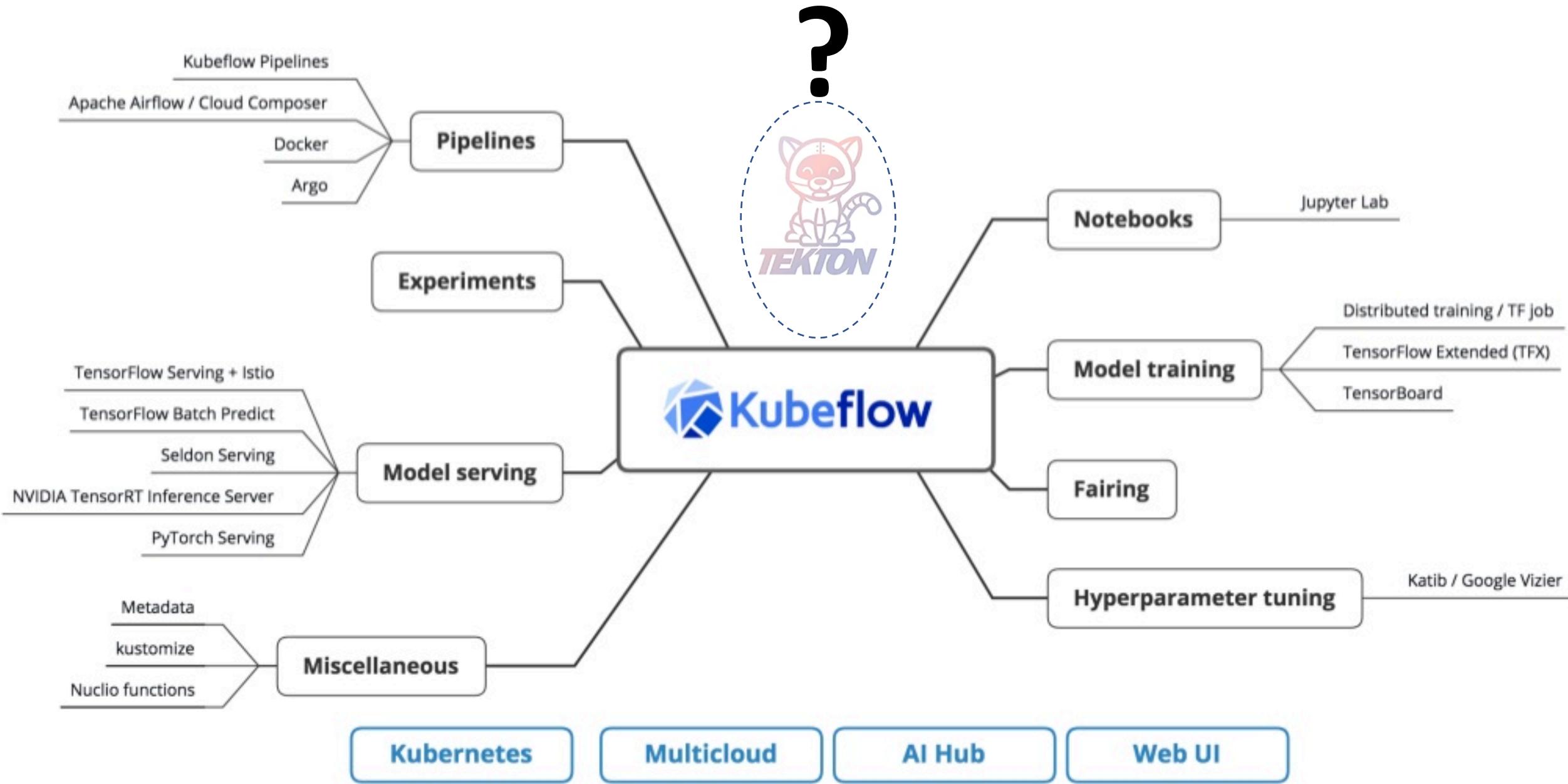


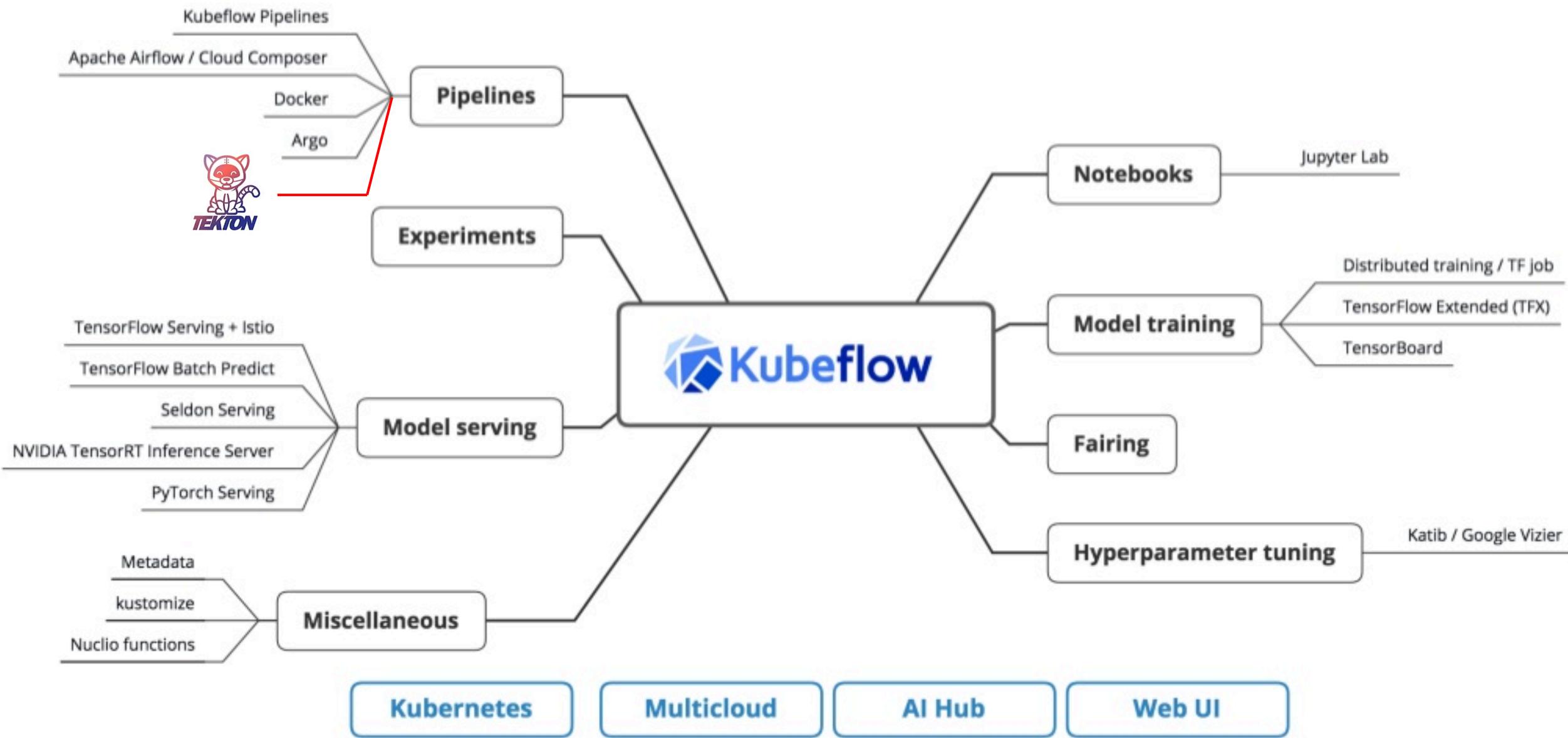
Data scientists

## MLOps (a compound of “machine learning” and “operations”)

A set of practices to help manage the “entire” ML lifecycle from integrating with model generation, orchestration, and deployment, to health, diagnostics, governance, and business metrics.



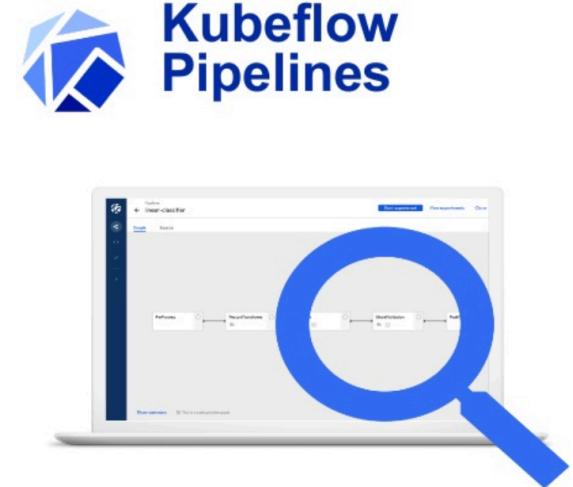




```

@dsl.pipeline(
    name='XGBoost Trainer',
    description='A trainer that does end-to-end distributed training for XGBoost models.'
)
def xgb_train_pipeline(
    output,
    project,
    region='us-central1',
    train_data='gs://ml-pipeline-playground/sfpd/train.csv',
    eval_data='gs://ml-pipeline-playground/sfpd/eval.csv',
    schema='gs://ml-pipeline-playground/sfpd/schema.json',
    target='resolution',
    rounds=200,
    workers=2,
    true_label='ACTION',
):
    delete_cluster_op = DeleteClusterOp('delete-cluster', project, region).apply(gcp.use_gcp_secret('user
    with dsl.ExitHandler(exit_op=delete_cluster_op):
        create_cluster_op = CreateClusterOp('create-cluster', project, region, output).apply(gcp.use_gcp_se
        analyze_op = AnalyzeOp('analyze', project, region, create_cluster_op.output, schema,
            train_data, '%s/{{workflow.name}}/analysis' % output).apply(gcp.use_gcp_sec
        transform_op = TransformOp('transform', project, region, create_cluster_op.output,
            train_data, eval_data, target, analyze_op.output,
            '%s/{{workflow.name}}/transform' % output).apply(gcp.use_gcp_secret('use
        train_op = TrainerOp('train', project, region, create_cluster_op.output, transform_op.outputs['tra
            transform_op.outputs['eval'], target, analyze_op.output, workers,
            rounds, '%s/{{workflow.name}}/model' % output).apply(gcp.use_gcp_secret('user
        predict_op = PredictOp('predict', project, region, create_cluster_op.output, transform_op.outputs['
            train_op.output, target, analyze_op.output, '%s/{{workflow.name}}/predict' %
        confusion_matrix_op = ConfusionMatrixOp('confusion-matrix', predict_op.output,
            '%s/{{workflow.name}}/confusionmatrix' % output).apply(gcp.
        roc_op = RocOp('roc', predict_op.output, true_label, '%s/{{workflow.name}}/roc' % output).apply(gcp

```



# CDF SIG MLOps

... creates designs, specifications, shared code, and processes to enable MLOps, Data and ML Pipeline capabilities on top of CD Projects !!



- initial implementations are driven through Tekton
- ... but **scope is broad** and covers all aspects of MLOps  
**(hyperparameter optimization, GPU workloads, complex scheduling, data distribution, ...)**
- Predicted growth rate of ML is 50% per year<sup>(\*Wikipedia so it must be right)</sup>  
... it **might** be what we are all doing in 5 years

# More Information...

## CDF SIG MLOps

<https://github.com/cdfoundation/sig-mlops>

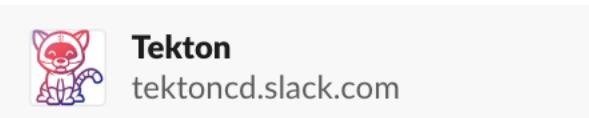
Meets every other Thursday – 9:30 pacific time – December 5th

## Kubeflow Project

<https://www.kubeflow.org/>

## Tekton Project

<https://github.com/tektoncd/pipeline>



@skaegi



**Kubeflow**



**Thank-you!**