ADASTRA

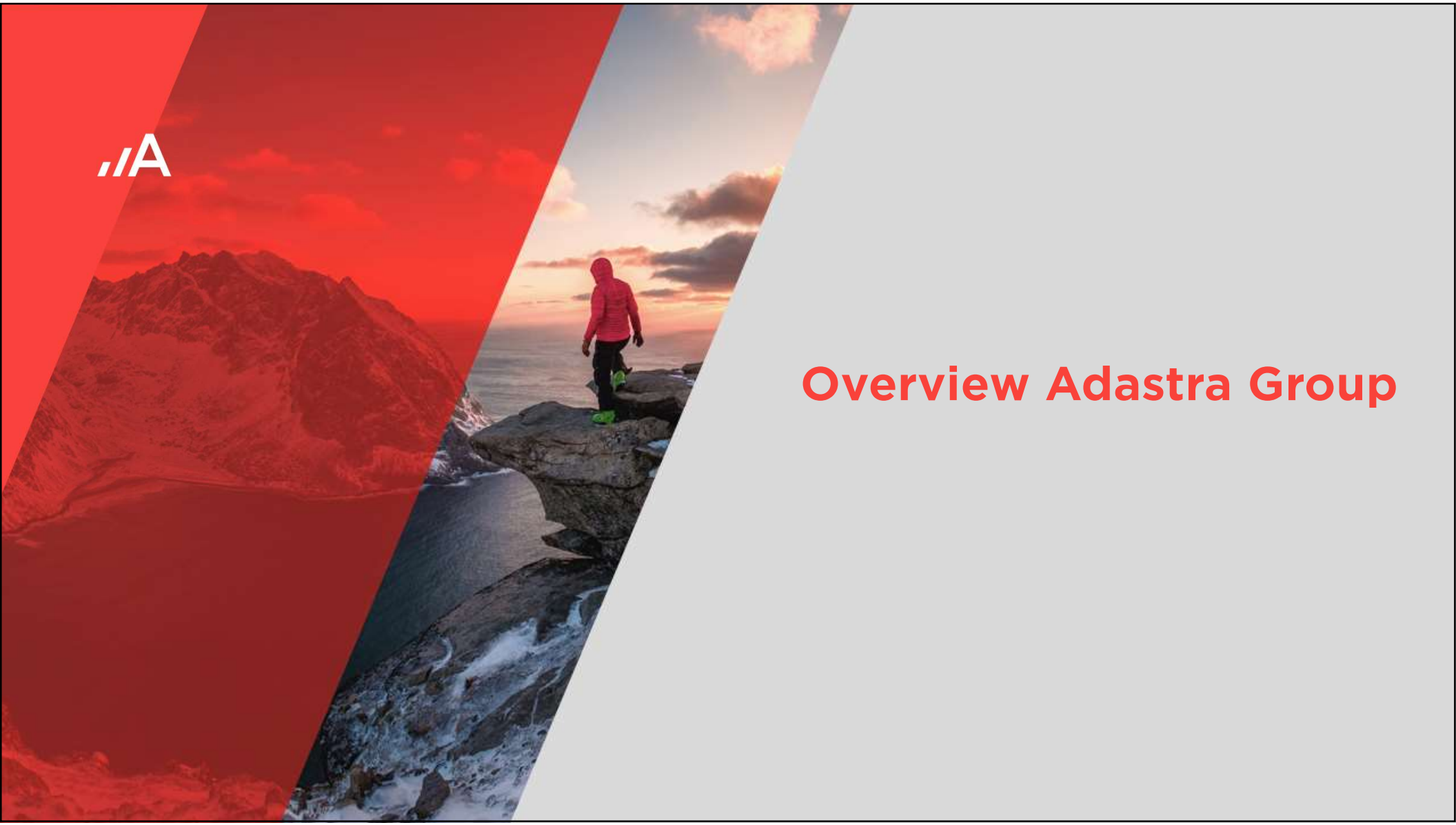
Interactive machine learning predictions using microservices and Tableau

11th May 2022

Dr. Johannes Mellenthin

BIG DATA & AI WORLD
BOOTH K25

Agenda



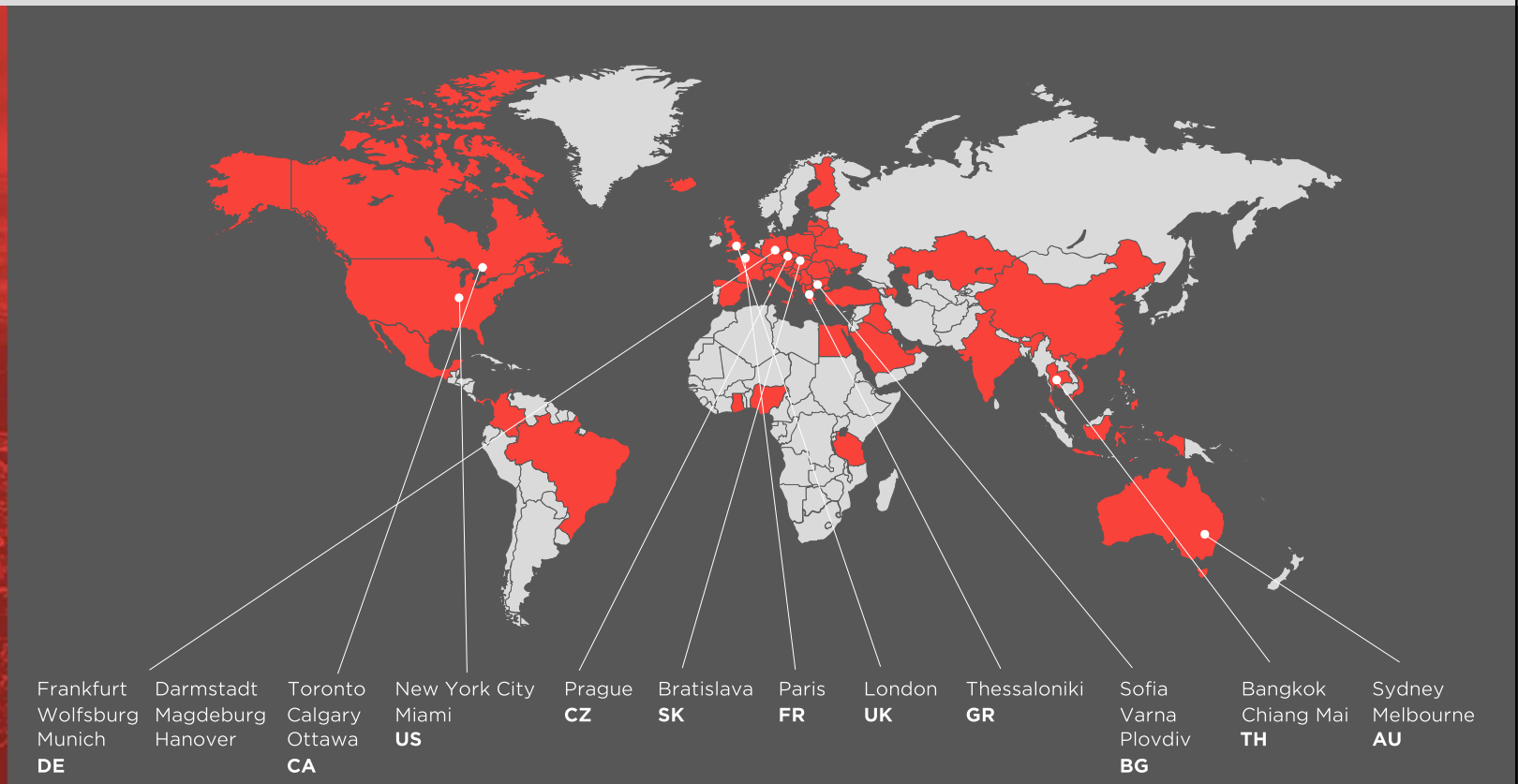
Overview Adastra Group

Adastra Group Worldwide

2000+
Professionals worldwide

5000+
Projects in 42 countries

23
Offices in 11 countries



We speak in actions and results

Our clients' success is the only measure of our own

Who we are

Adastra is an international consulting company that creates functional solutions in various sectors, facilitating the transition to the digital era. We transform the Data & Analytics space by providing smart solutions.

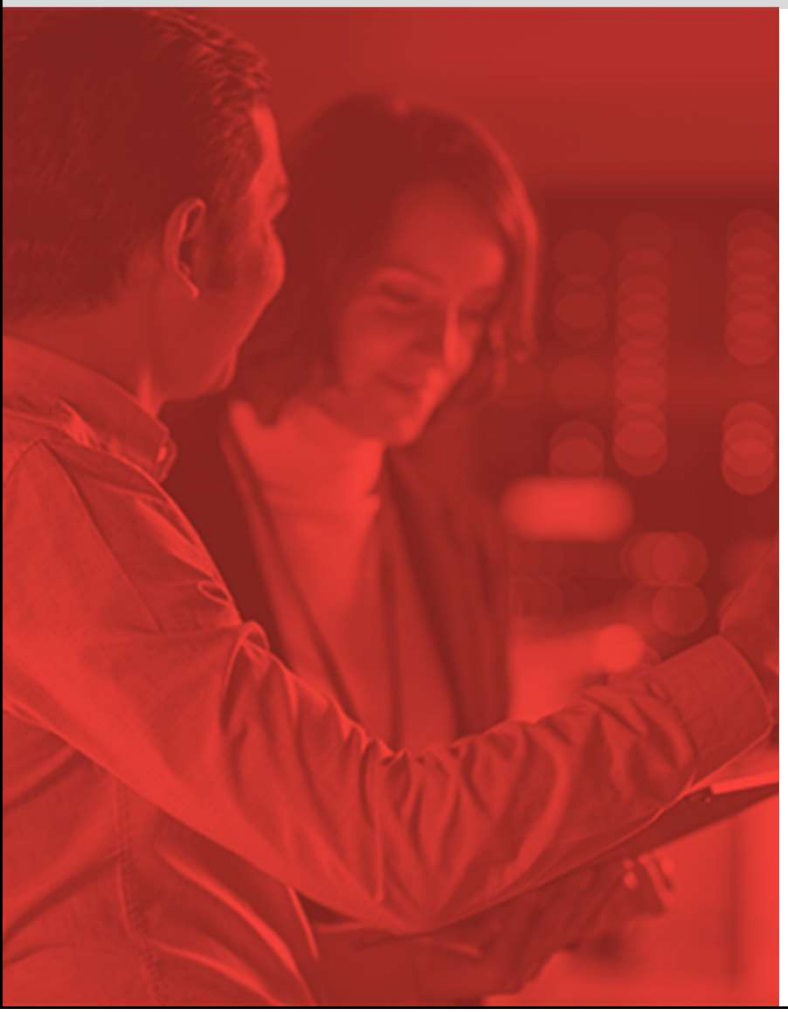
WE ♡ DATA

Data

Data has long been at the center of our activities. We have been helping market and industry leaders across the globe to harness and leverage their data assets, accelerate innovation, improve operational excellence, and create unforgettable customer experiences.

Make ML Predictions Accessible

Data-driven



Make data insights available to everyone

- BI reporting through various dashboards well established
- Advanced analytics and machine learning predictions become more and more important in the daily business
- How can these insights be made available to end users?

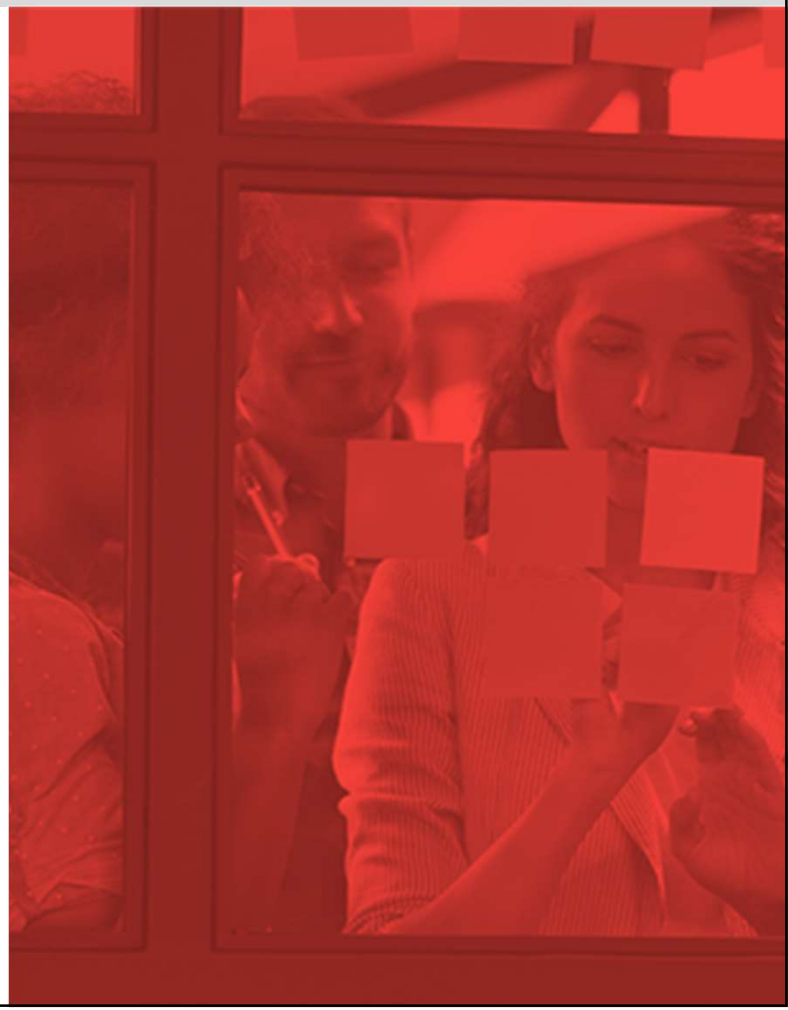
Calculate predictions in advance

Run machine learning predictions during ETL

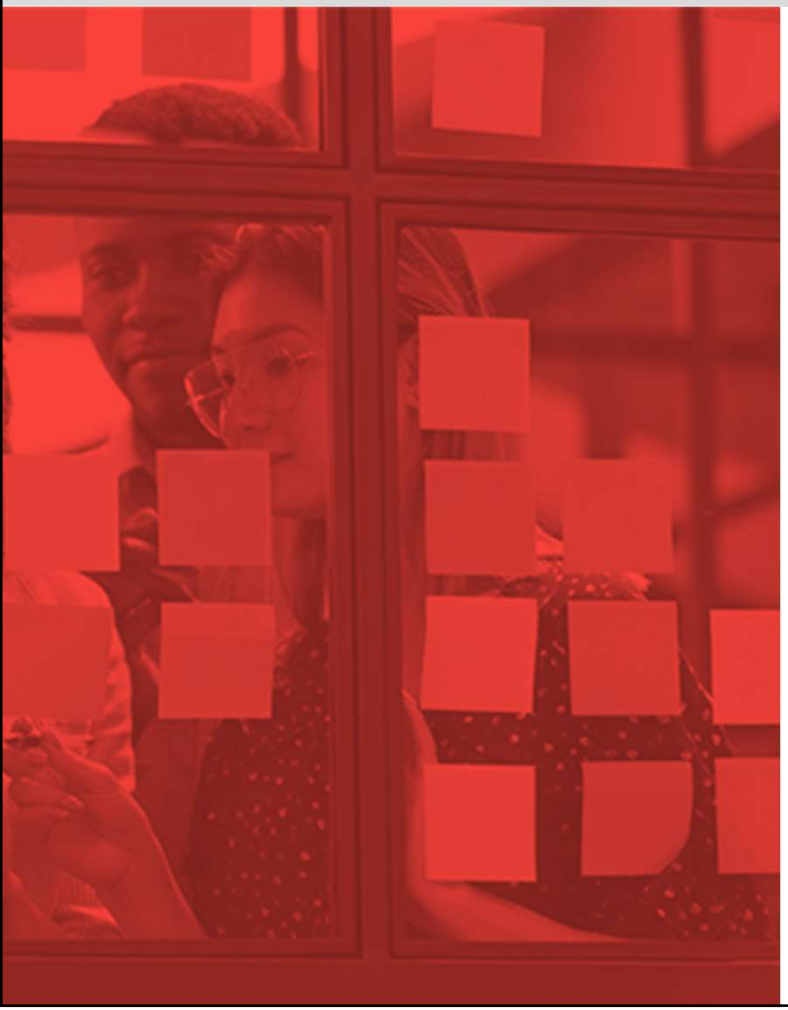
- ML predictions are calculated for all relevant data points in advance
- Relevant data points must be known
- Predictions' output is saved to data base
- Predictions can then be shown in front-end to end users

→ Only possible for limited number of predictions

→ Example: predict next months' sales for 5 items



Real-time predictions



Interactive ML predictions

- End users can specify input data for the machine learning predictions in front-end
  - Through various filters
  - Freely choose input
- User input is then forwarded to ML model for a real-time prediction
- ML prediction output is then sent back to user

→ Example: predict credit rating based on income and age

Use Case

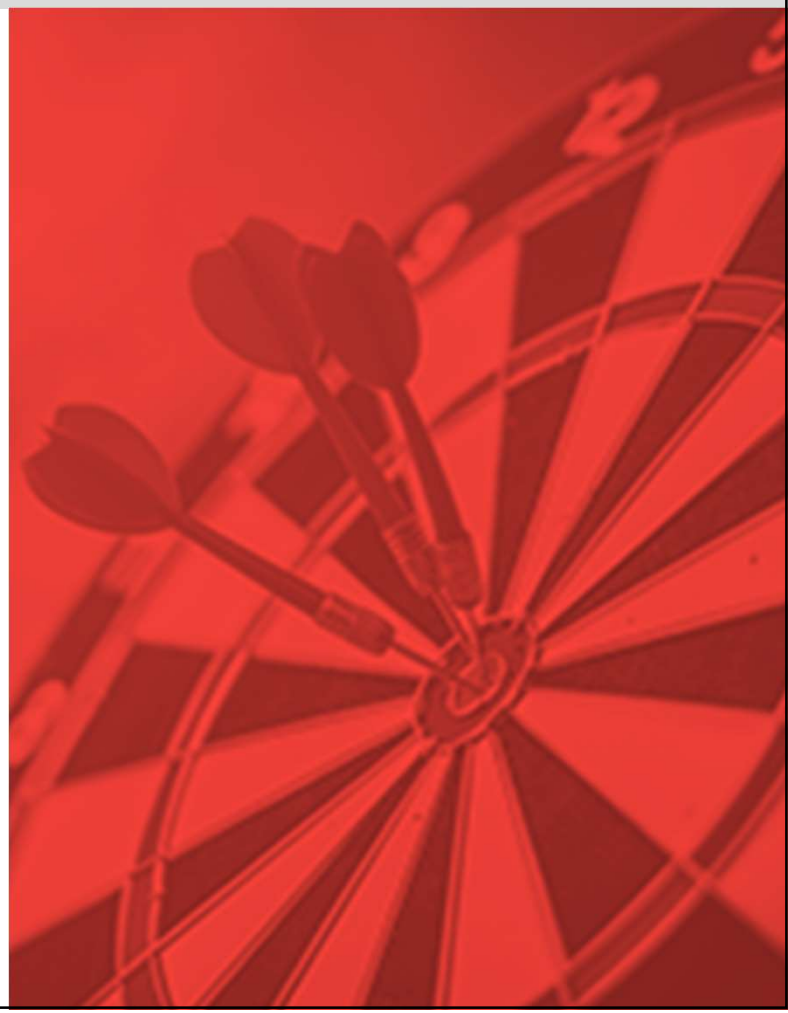
Requirement

- Ensure interactive machine learning predictions to end users

- Use well-known front-end interface: Tableau
  - → Single sign-on & user management
  - → Powerful dashboarding capabilities

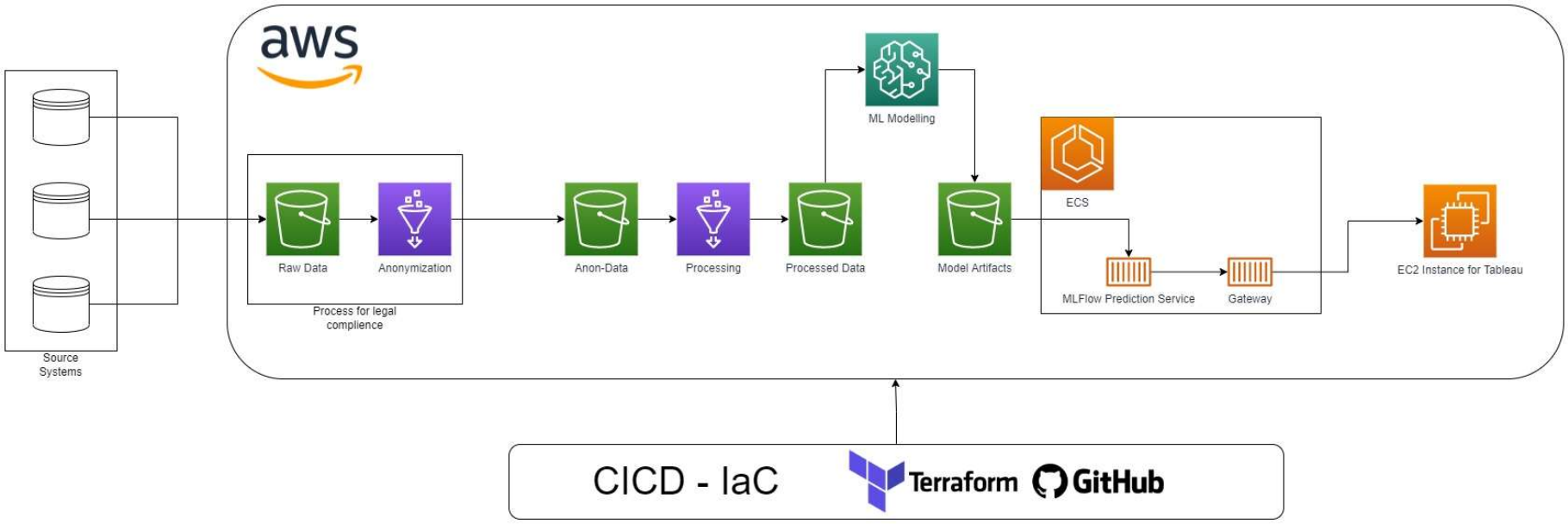
Goal

- Predict number of sold items dependent on:
  - Item type
  - Region
  - Sales channel
- For varying incentive heights

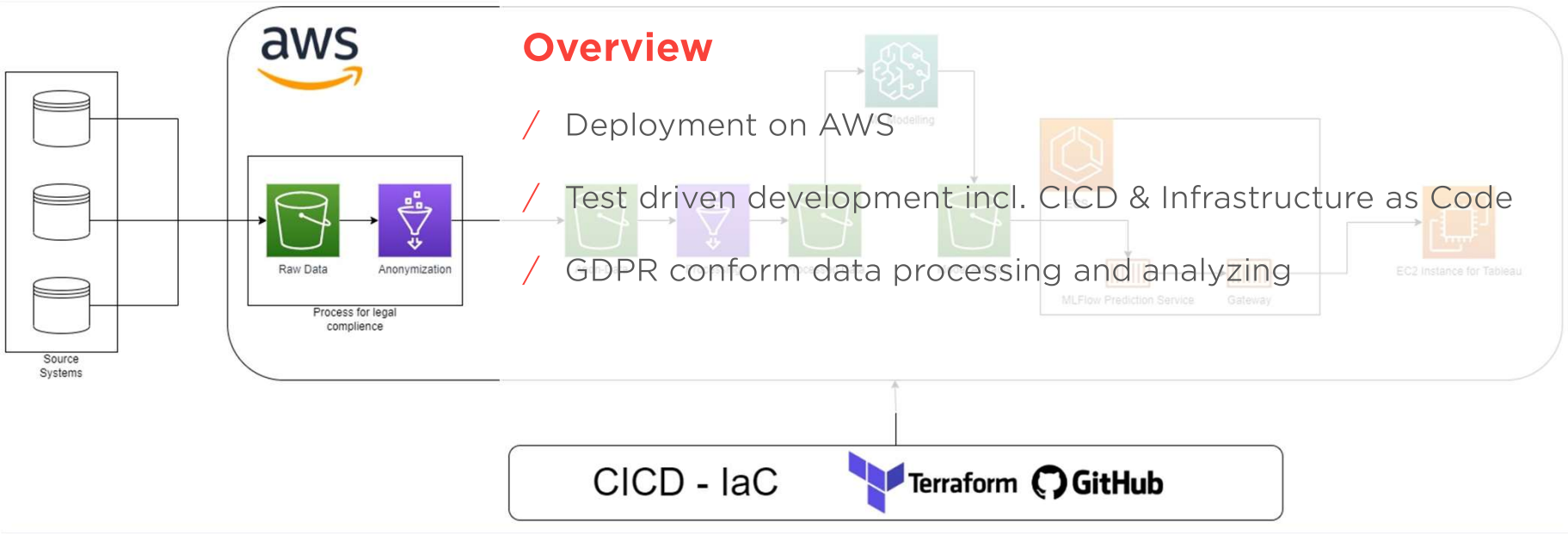


Microservice Architecture

Microservice Architecture



Microservice Architecture



Overview

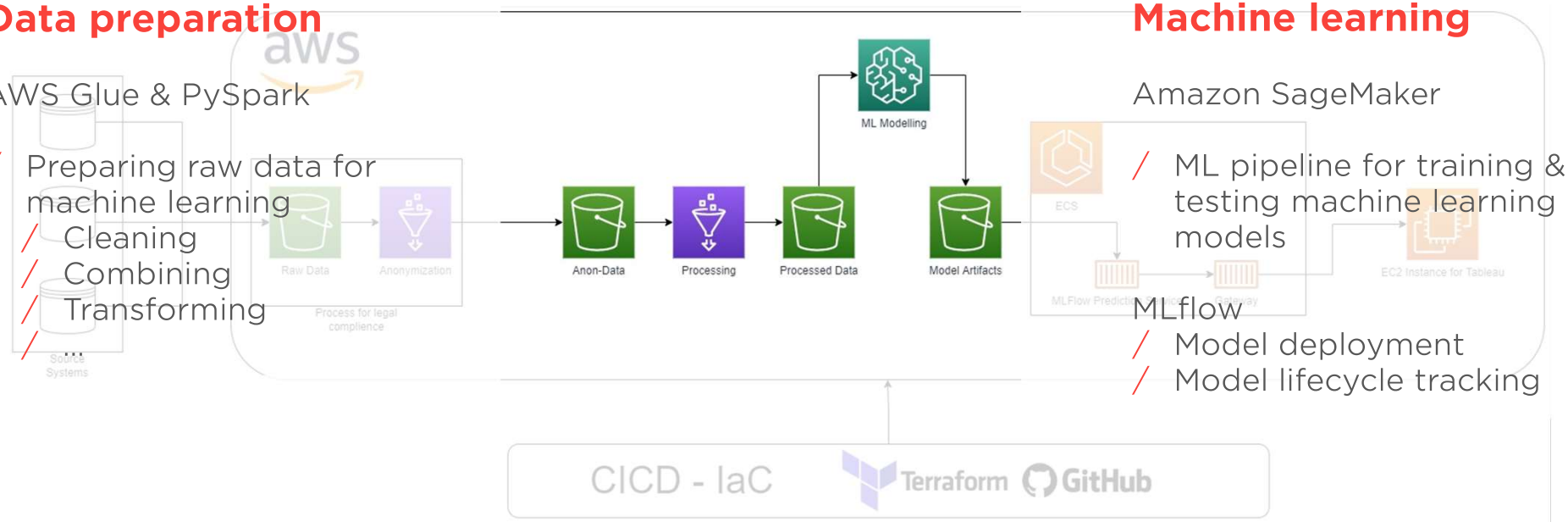
- Deployment on AWS
- Test driven development incl. CICD & Infrastructure as Code
- GDPR conform data processing and analyzing

Microservice Architecture

Data preparation

AWS Glue & PySpark

- Preparing raw data for machine learning
  - Cleaning
  - Combining
  - Transforming
  - ...



Machine learning

Amazon SageMaker

- ML pipeline for training & testing machine learning models

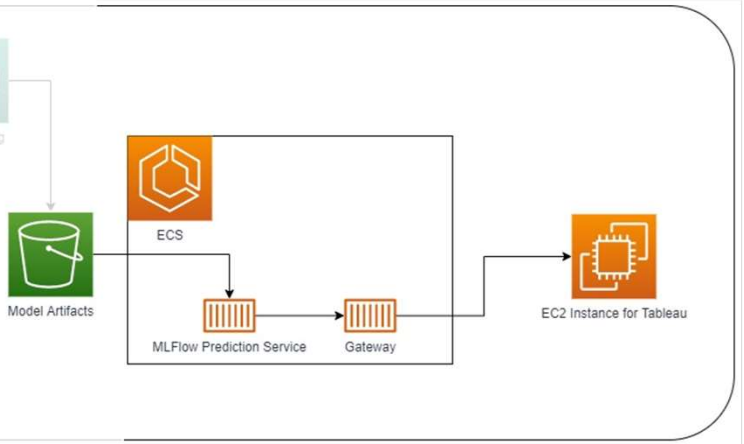
MLflow

- Model deployment
- Model lifecycle tracking

Microservice Architecture

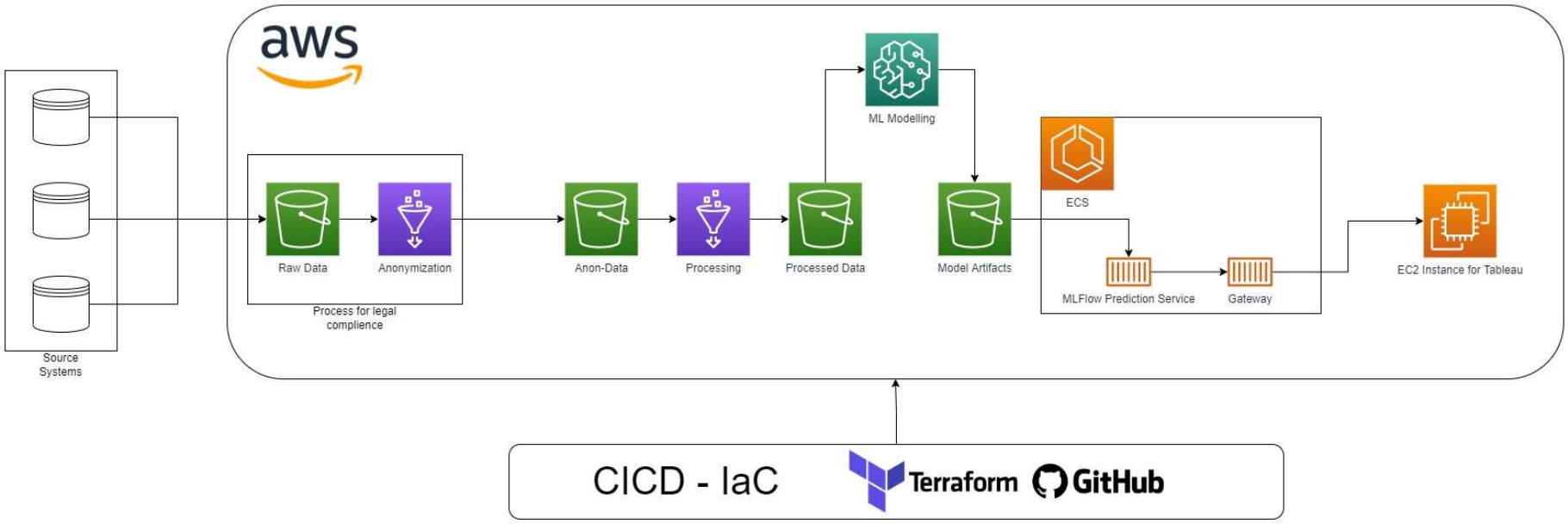
Connecting Tableau to MLflow via API

- Tableau Analytics Extensions API limited
- Use AWS Fargate as middleware to translate API calls between Tableau & MLflow



- → User input in Tableau
- → API call sent to middleware
- → Transform Tableau API call to MLflow format
- → Compute prediction in real time
- → Transform prediction output to Tableau API format
- → Sent prediction back to Tableau
- → Show user result

Microservice Architecture



Example Tableau Dashboards

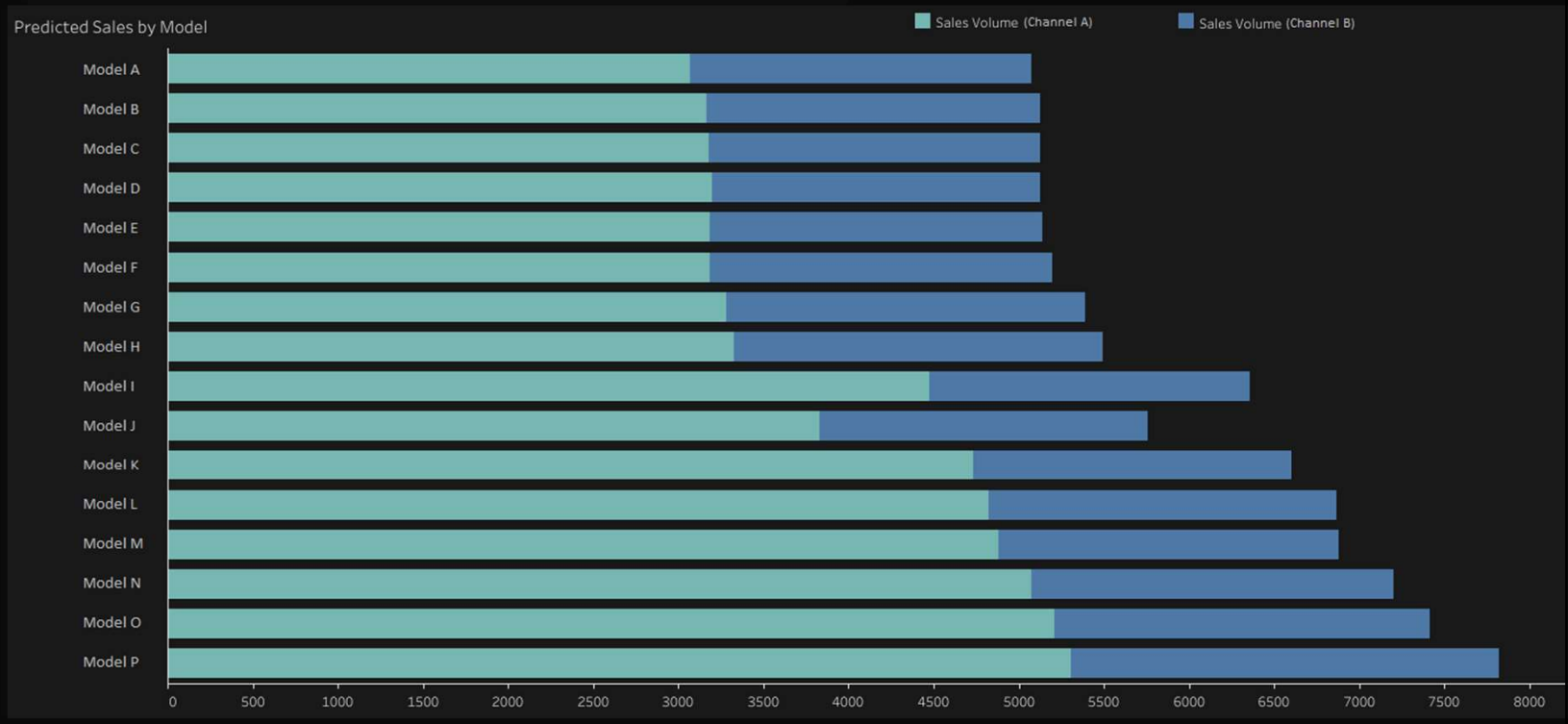
Interactive ML predictions

Basic Prediction | Simulated Prediction | Export

ML model version: f35074581df2460b915deb0e429f2107
last data update: 06/05/2022 04:01:16

Show Prediction for Date 01/06/2022 filtered by Model All Region All displayed by (•) Model ( ) Region

Incentive Configuration	(Channel A)	(Channel B)
Model A	100 €	100 €
Model B	100 €	100 €
Model C	100 €	100 €
Model D	100 €	100 €
Model E	100 €	100 €
Model F	100 €	100 €
Model G	100 €	100 €
Model H	100 €	100 €
Model I	100 €	100 €
Model J	100 €	100 €
Model K	100 €	100 €
Model L	100 €	100 €
Model M	100 €	100 €
Model N	100 €	100 €
Model O	100 €	100 €
Model P	100 €	100 €



Interactive ML predictions

Range of predictions

Basic Prediction | Simulated Prediction | Export

ML model version: f35074581df2460b915deb0e429f2107
last data update: 06/05/2022 04:01:16

Show Simulation for Date 01/06/2022 Model A filtered by Region All

Incentive Configuration

Incentitive Simulation (x-Axis) should be set for

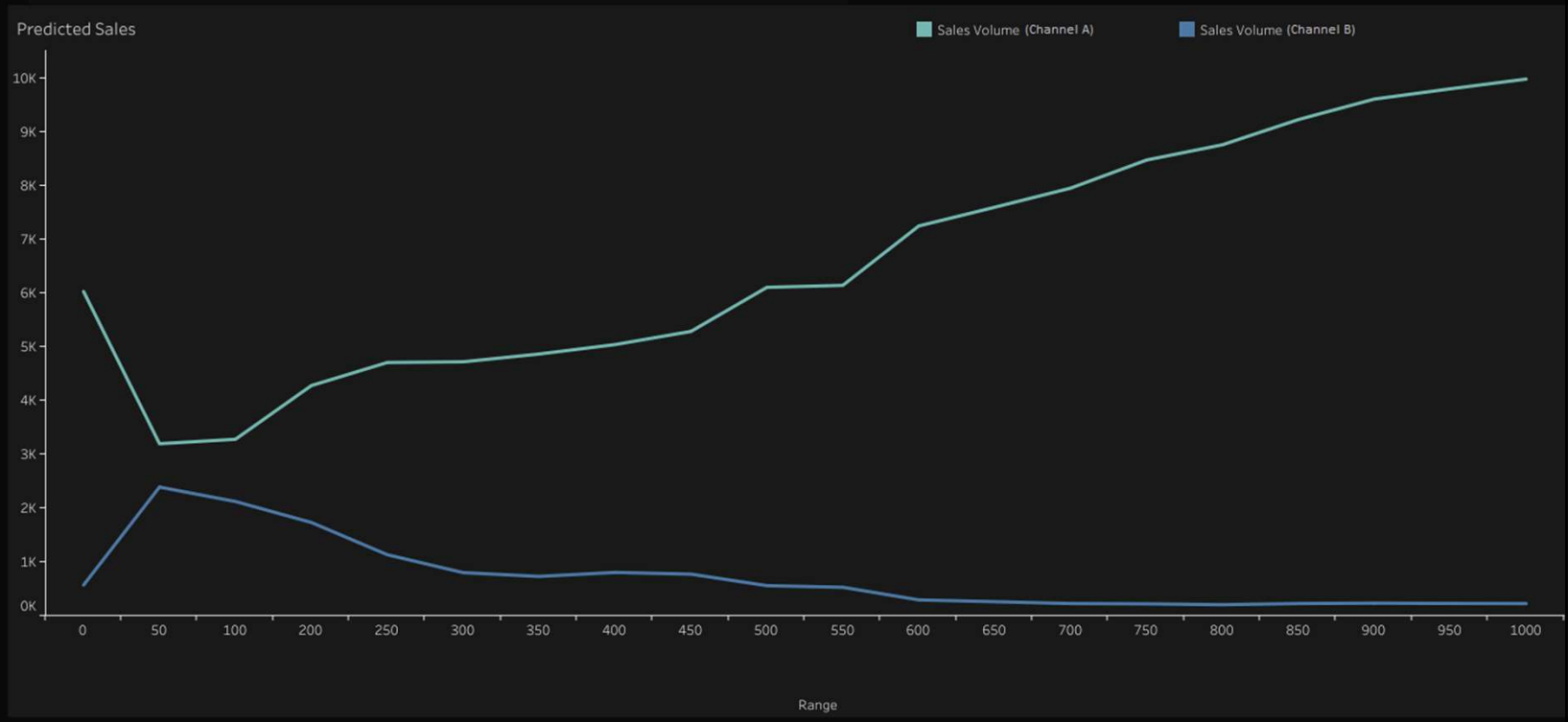
(Channel A)
(Channel B)

with a Range of

0 to 1000

and a Step Size of 50

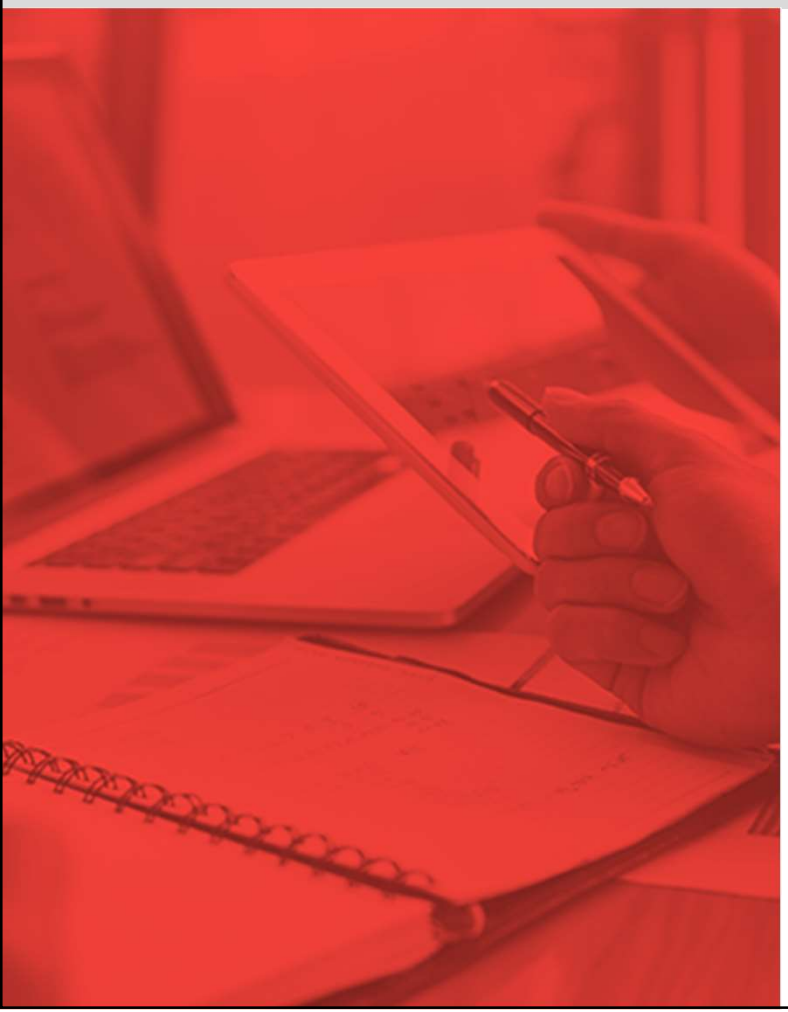
and fixed (Channel B) of 100 €



Range of predictions

Conclusions

Results



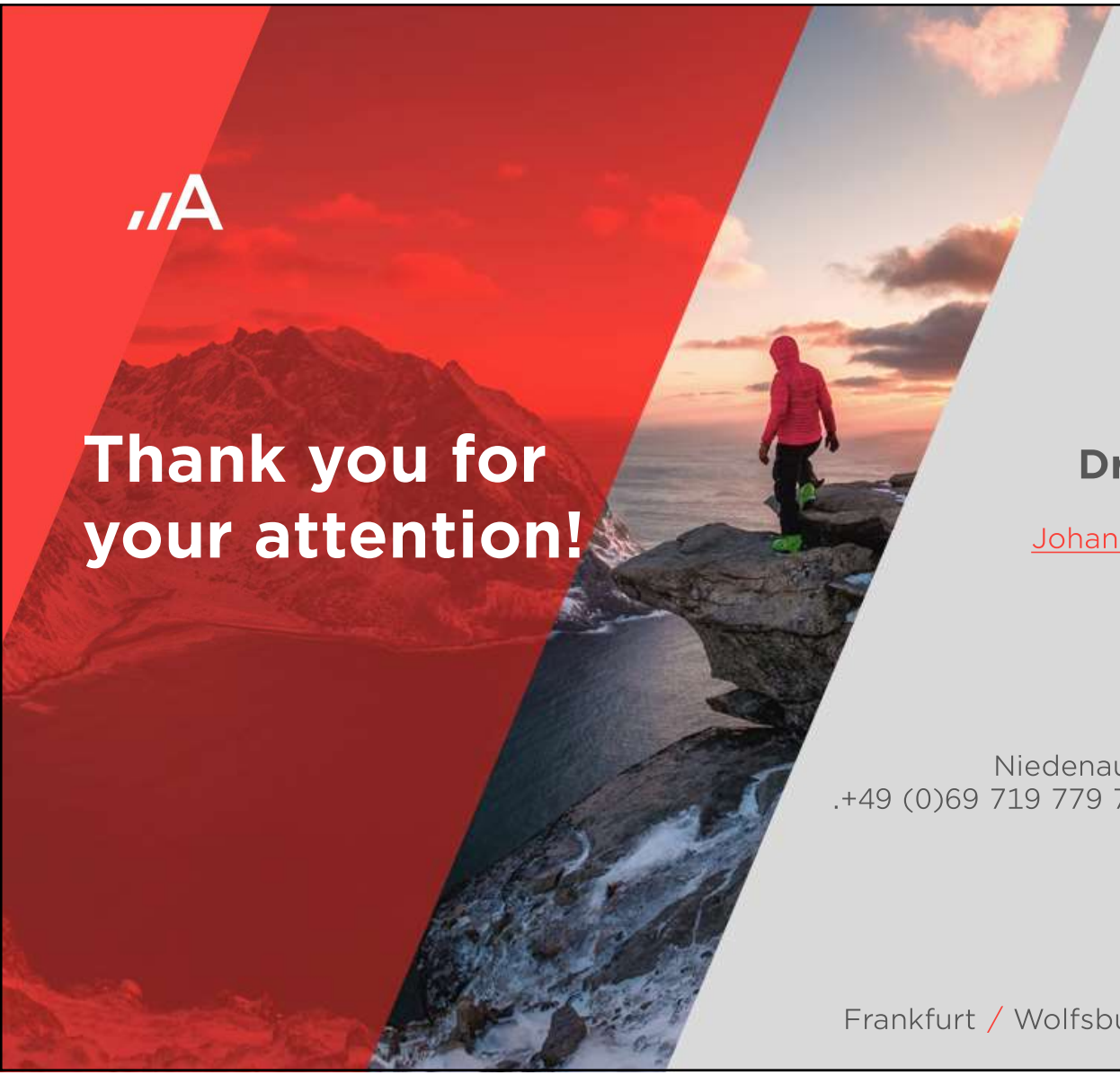
- End users receive real-time machine learning predictions based on their custom input
- Tableau used as front-end
- Scalable microservice architecture

Take Away Messages

- Making **machine learning insights easily accessible** to the **end users** is crucial

- **Microservice architecture**
  - Big Data technologies for data manipulation
  - Enabling **interactive** machine learning **predictions**
  - Scalability

- **Tableau** can be used for **interactive machine learning predictions** for **complex user input**



Thank you for your attention!

Find us at booth K25

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