



Utilizing Qlik AutoML

How to enable new business cases with
Machine Learning and AI

Hannu Ranta

Principal Enterprise Architect

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Background

- **Hannu Ranta**
- Principal Enterprise Architect @ Qlik
- Master of Science in Tech @ Tampere University of Tech
- Diving, Snowboarding, Skiing, Windsurfing, Golf



LAN W

26.2.2021
DAX
Siemens Energy
Lufthansa
Knorr-Bremse

- Aareal Bank
- Airbus (NL)
- Aixtron
- Austria Office
- Aroundtown Property (LU)
- Aurubis
- Bechtle
- Boss
- Brenntag IT
- Cancom IT
- Carl Zeiss Med.
- Commerzbank
- CompuGroup Med.
- CTS Eventim
- Dür
- Evonik Industries
- Evotec
- Frapport
- Freemove
- Fluents VZ
- GEA Group
- Garresheimer
- Global City Properties (LU)
- Harber
- Herbol

Company	Price	Change
Aareal Bank	72.30	+0.20
Airbus (NL)	156.30	+1.10
Aixtron	31.34	-0.63
Austria Office	64.26	-0.09
Aroundtown Property (LU)	53.00	-2.97
Aurubis	124.30	-0.25
Bechtle	5.43	-0.68
Boss	71.10	-1.88
Brenntag IT	36.40	-2.64
Cancom IT	27.72	-1.35
Carl Zeiss Med.	32.30	-1.78
Commerzbank	52.07	0.59
CompuGroup Med.	17.55	-0.59
CTS Eventim	45.34	-2.57
Dür	28.82	-1.49
Evonik Industries	85.80	-2.12
Evotec	20.34	-5.26
Frapport	140.30	-0.09
Freemove	49.02	-2.18
Fluents VZ	64.50	0.82
GEA Group	73.85	0.13
Garresheimer	9.24	-0.75
Global City Properties (LU)	80.34	-1.05
Harber	105.34	-2.30
Herbol	50.00	-0.80



Bank of America NA
Barclays (UK)
Bayer Crop Sci

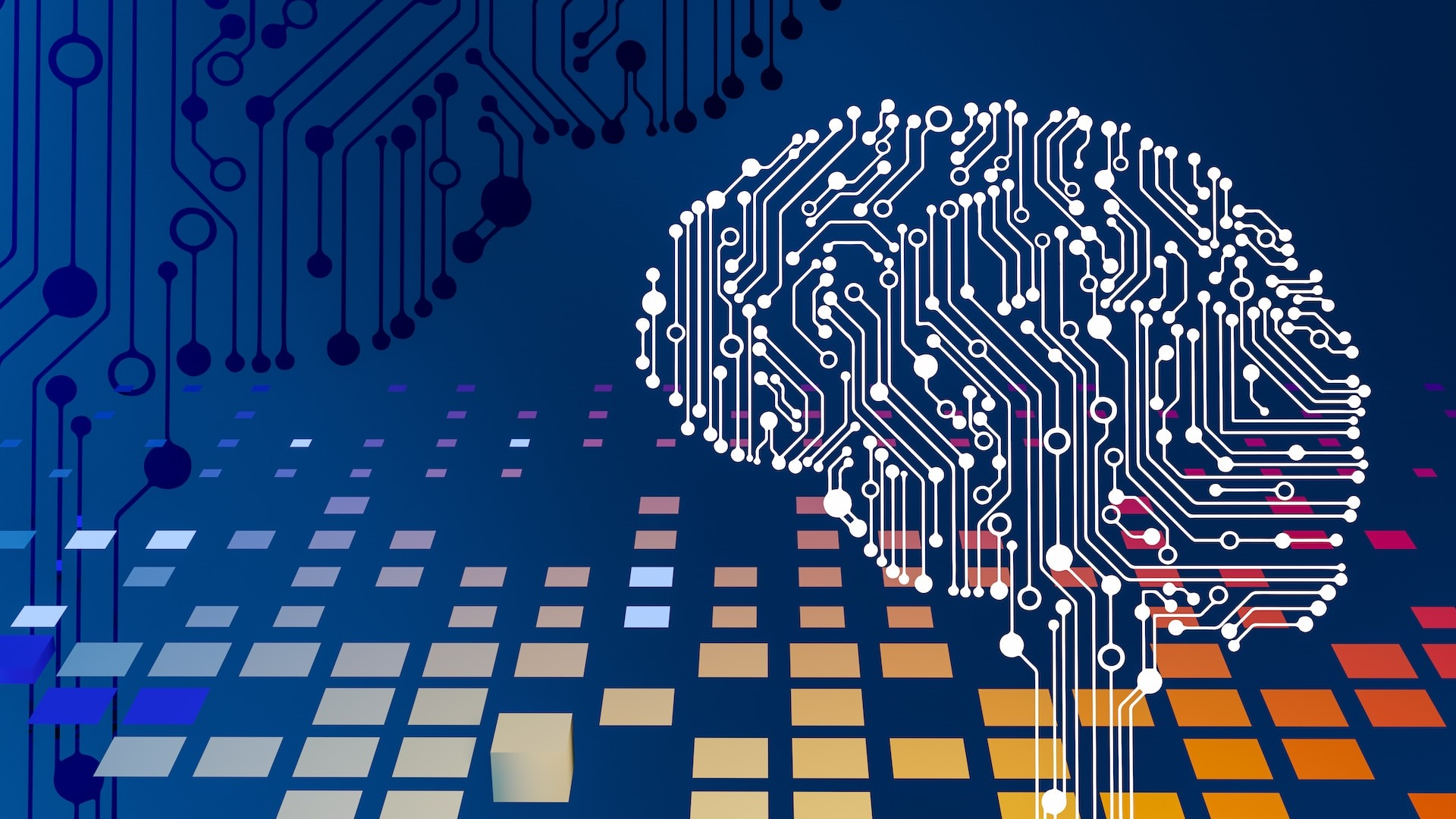
- Bayer
- Bayer Life
- BayWa PA
- BB Biotech (CN)
- Bertrand
- Bet-at-Home
- Biotronera
- Biogen (US)
- BionTech
- Biogen
- Binest VZ
- Blackrock (US)
- Bombardier B (CN)
- Booking (US)
- Brain
- Bristol-Myers Squ (US)
- BYD CO (CN) (CN)
- Carrefour (FR)
- Cassidy VZ
- Cent Syst
- Chuguan (US)
- China Pharm (US)
- China Pharm (CN)





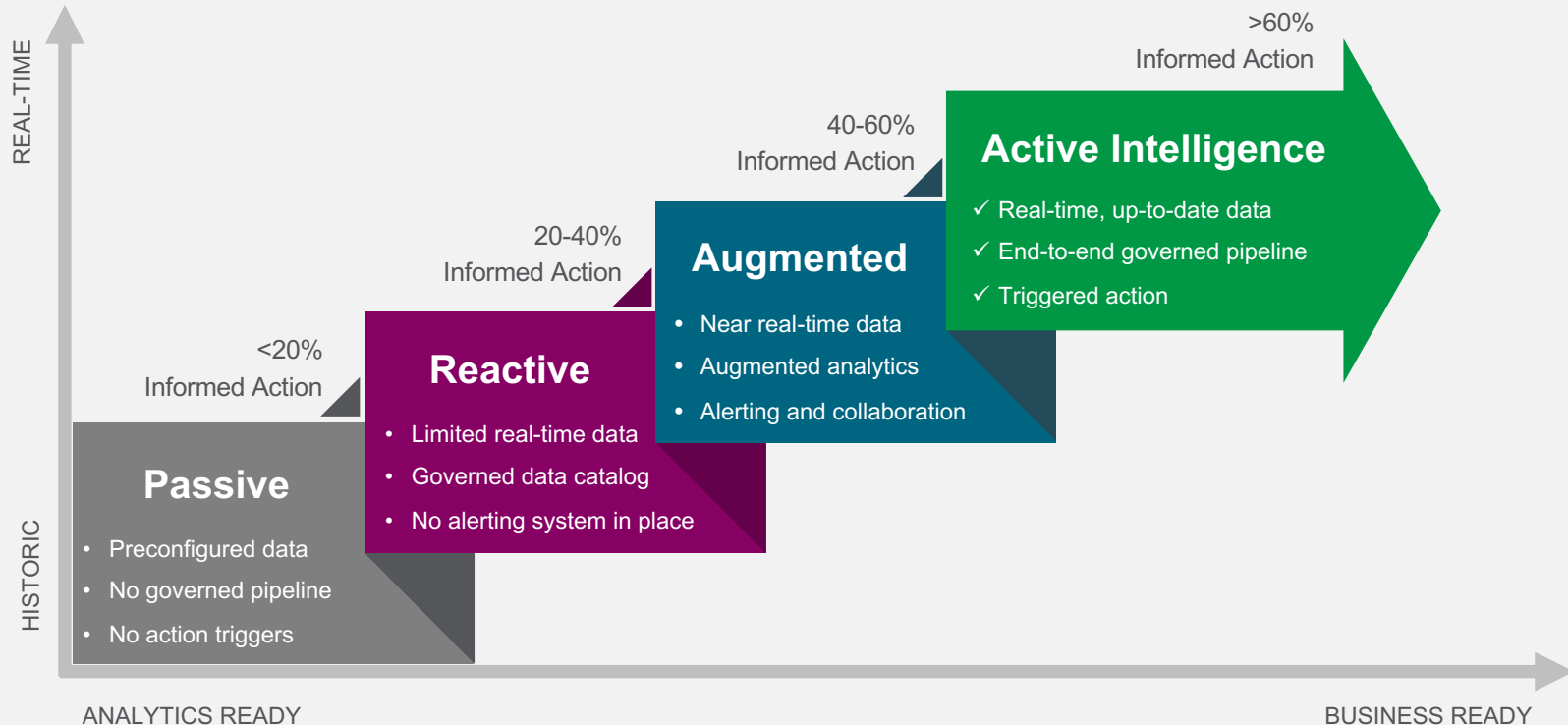
Bank.

Bank



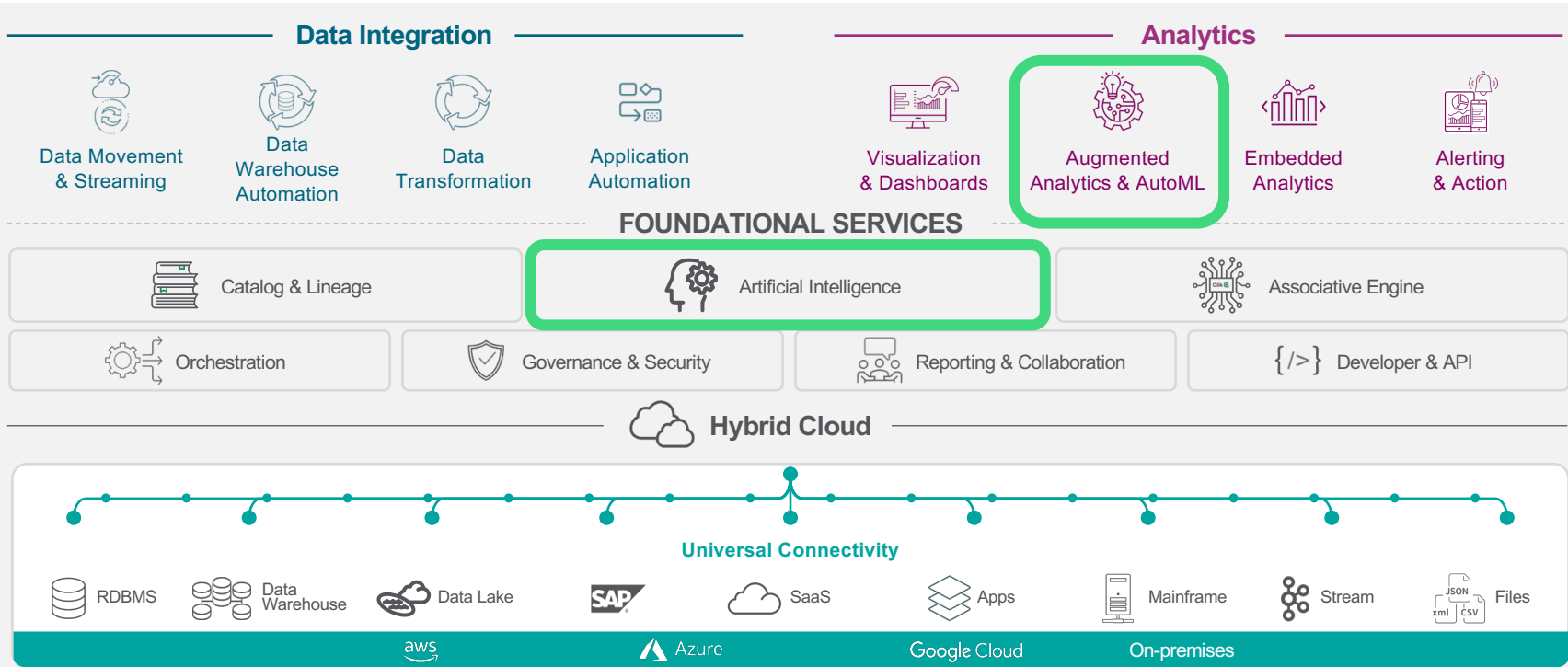
Drives Best Practice

Expands the breadth and depth of customers capability



Qlik Cloud

Qlik's Platform for Active Intelligence



Recent Analytics Innovations

Augmented Analytics
Analysis Types & NLG



Insight Advisor
Search & Chat



Qlik AutoML
Predictive Analytics



Data Science
Integration



Intelligent Alerting



Notes & Collaboration



Qlik Sense Mobile



Simplified Authoring and Visualizations



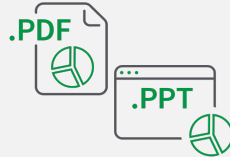
Embedded Analytics



Application Automation



Reporting & Distribution



Data Catalog and Lineage



Direct Query & Data Gateway



Connector Factory



And additional improvements in analytics, management & governance, and accessibility

Qlik's Augmented Analytics Capabilities

A full suite of AI features working together

Advanced Analytics Integration

Direct integration with 3rd party data science platforms via APIs, allowing business users to explore in real-time



Insight Advisor

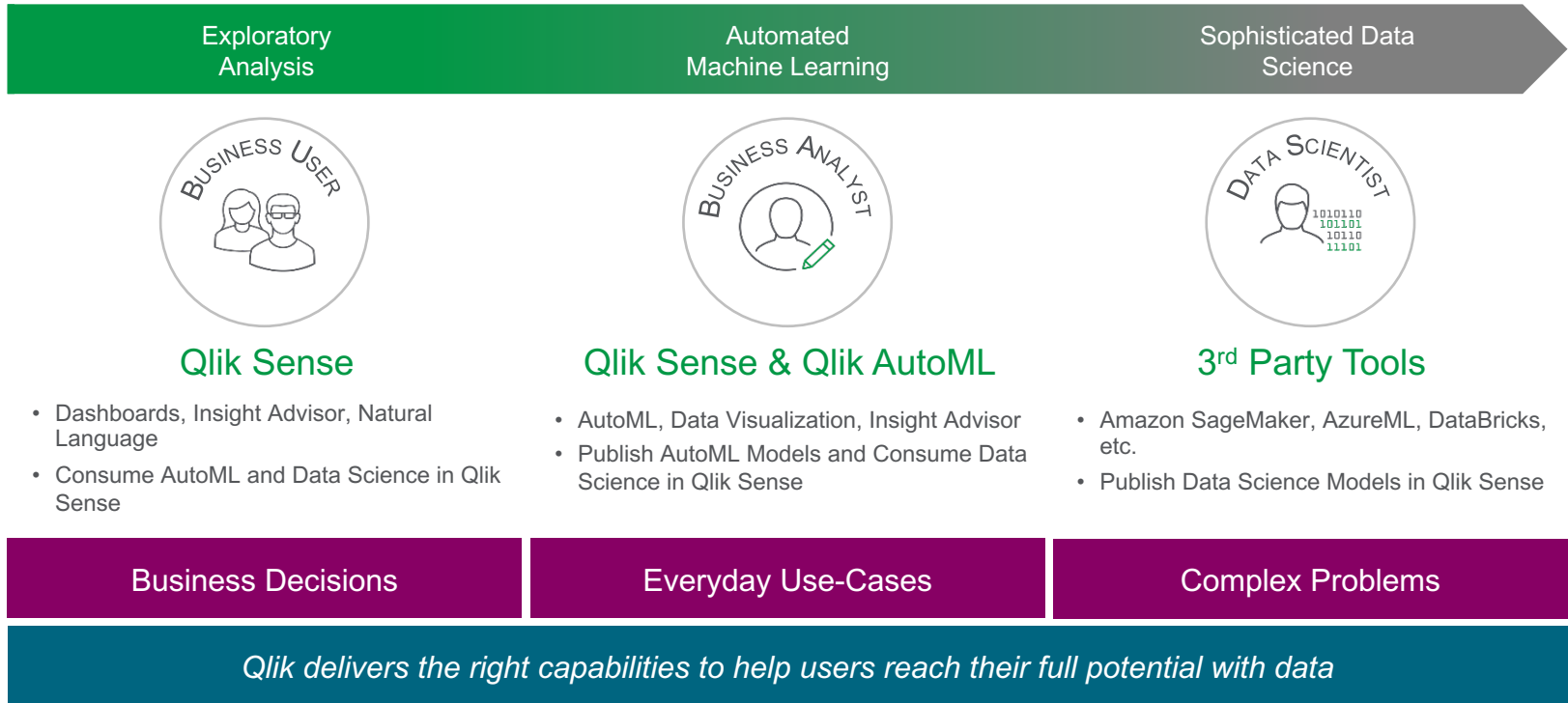
AI assistant in Qlik Sense® for insight generation, task automation, natural language interaction (NLP/NLG)

Qlik AutoML™

Automated creation of machine learning models from historical data to test scenarios and predict future outcomes

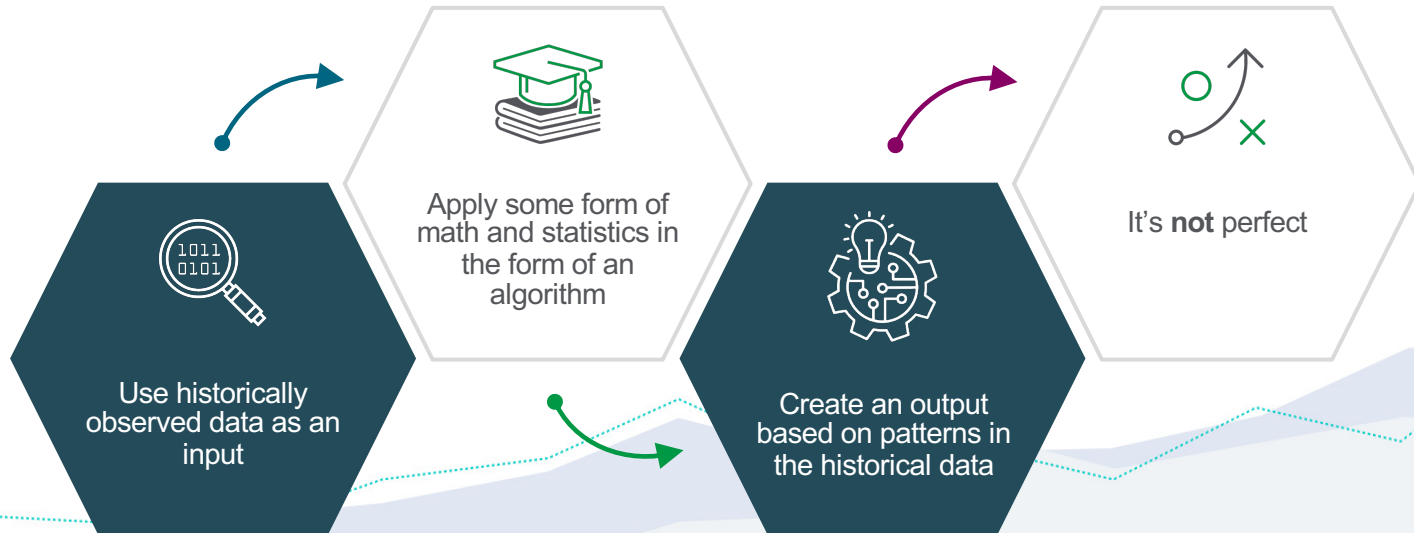
Serving all users and use cases

Qlik unlocks the power of augmented analytics for everyone



What is Machine Learning?

“Recognizing patterns and drivers in historical data to create models that predict future outcomes.”



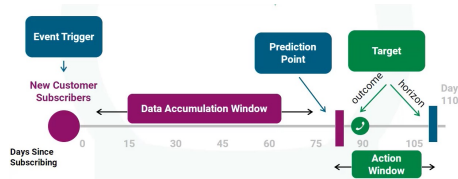
Qlik AutoML



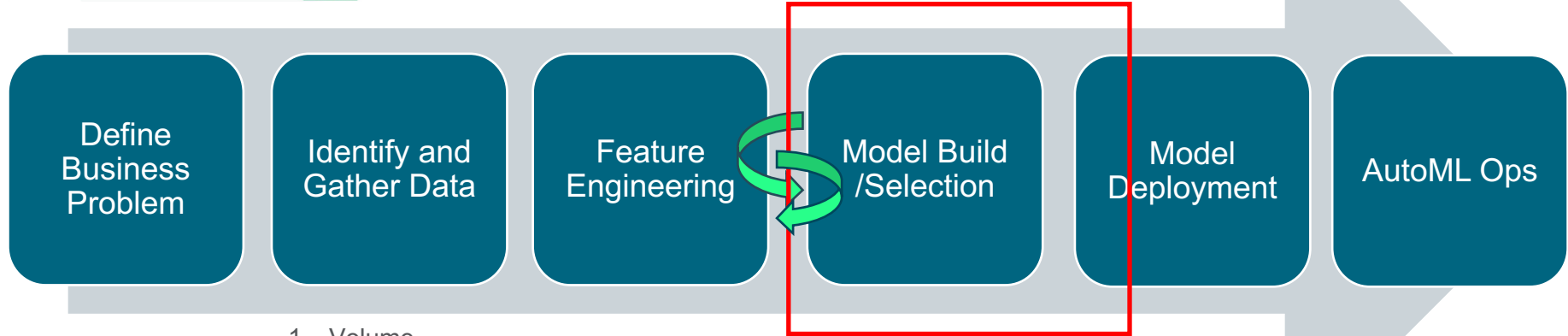
The AutoML Life

AutoML address?

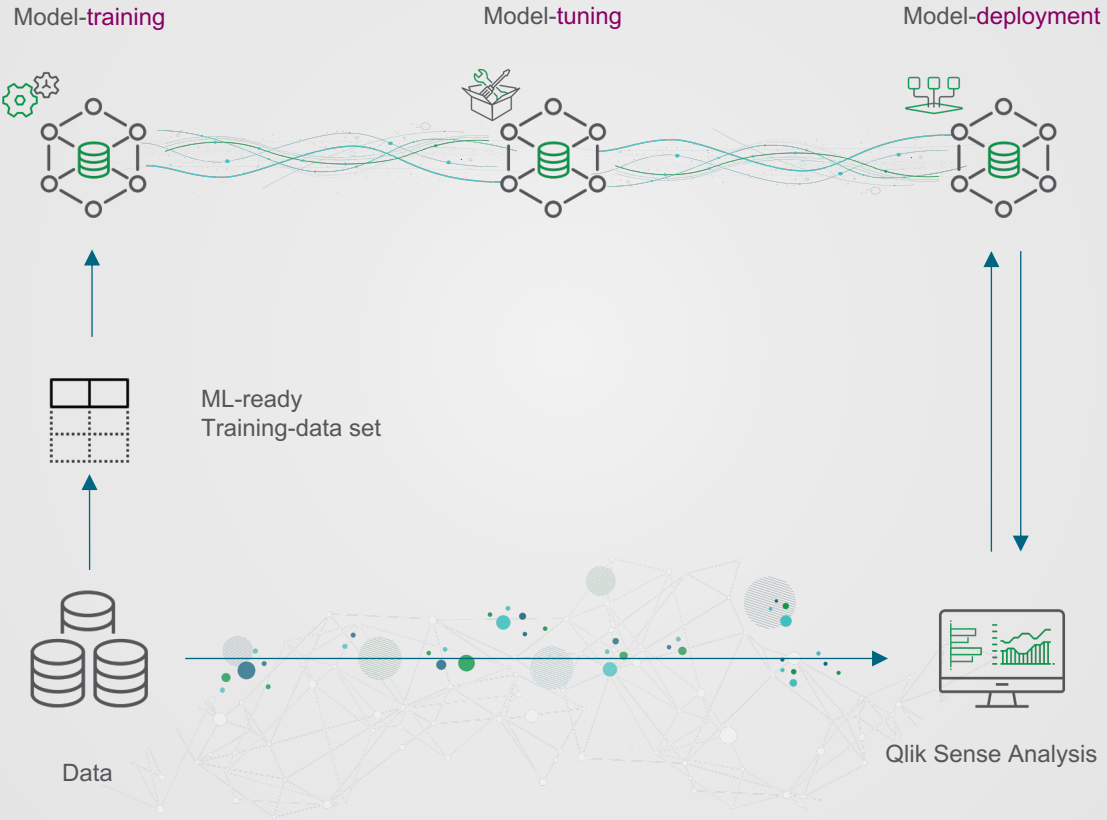
Business Objective	Target	Original Feature	Alternative Feature	Possible Benefits
Will a sales opportunity close?	Closed Won (Y/N)	# of Meetings	1. Meetings/Mo 2. Meetings in Stage X	1. Transforms to meeting freq; better accounts for change 2. Better expresses sales momentum; accounts for cycle
Predict a future transaction amount?	\$ of Next Transaction	Last Order Amt	1. Avg Order Amt 2. %Chg Order Amt	1. Broader account of order behavior 2. Growing/decelerating buying pattern; standardized
Will a customer churn?	Churn (Y/N)	Customer Temperature	1. Chg in Temp 2. Days in Curt Temp	1. Change in sentiment more likely to lead to action 2. Duration of current state
Will an employee voluntarily term?	Terminate (Y/N)	Salary	1. Salary vs Peers 2. Salary/Industry Avg	1. Better aligns to employee's experience/sentiment 2. Better aligns to employee's opportunity cost
Will a lead convert to an apply?	Converted (Y/N)	How'd you find us?	1. Answered? (Y/N)	1. The action is what matters, not answer 2. Nulls here mean something - inaction!



Qlik AutoML Solution

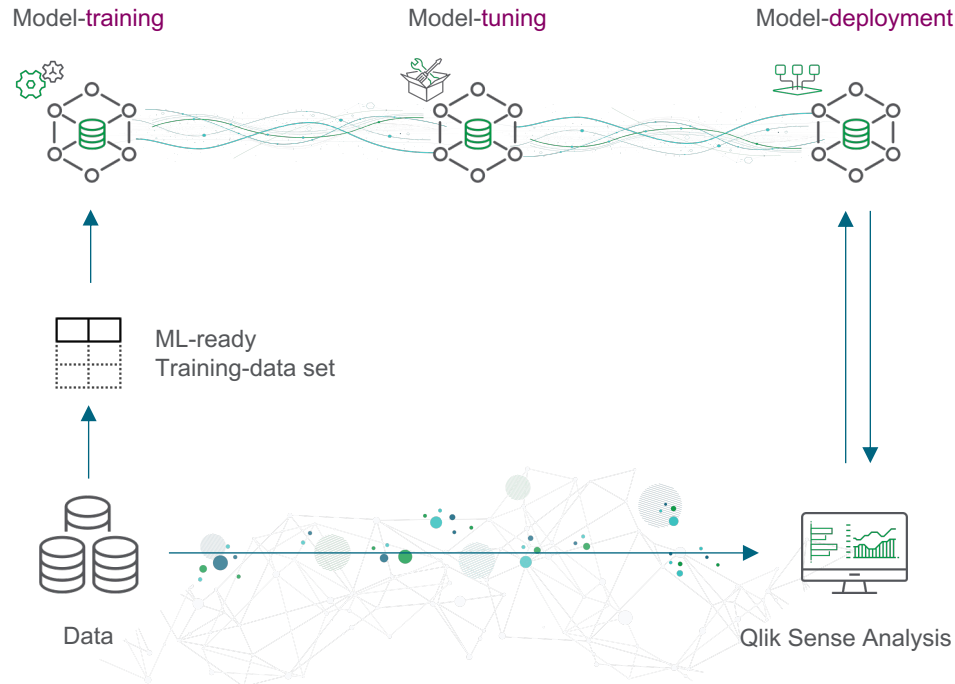


1. Volume
2. Data Leakage
3. Relevance (current)
4. Distribution
5. Time based



Qlik AutoML Workflow

High-level Workflow



Real-time:
*Predictions via
API Access*



Ad-hoc:
Dataset prediction



Batched:
*Can be used in
Qlik Load Script
(Qlik AutoML Connector)*



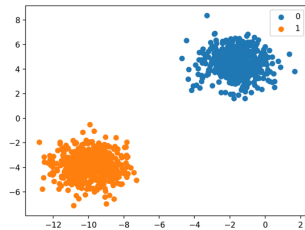
Real-time:
*Can be used in
Qlik Sense Frontend
(endpoints.ScriptEvalStr(...))*

What type of questions Qlik AutoML can solve?

Binary Classification:

Any question that can be answered with a **Yes or No**

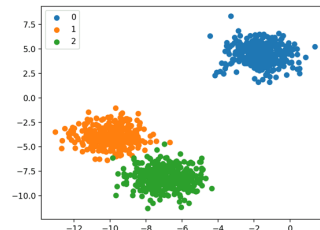
- Will a customer churn?
- **Will my inventory stock out?**
- Will my project be on budget?
- Does preventative maintenance need to be performed?
- Will a patient cancel their hospital appointment?



Multi-Class Classification:

Questions where there could be **multiple outcome choices**

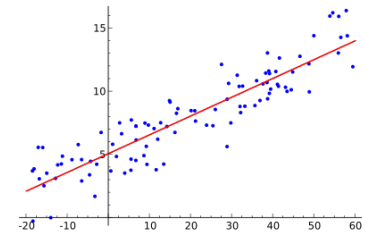
- What product will a customer purchase?
- What subscription type best fits the customer?
- **Which inventory groups will be out of stock?**
- What facility will a patient be discharged to?



Regression/Numeric:

Predicting a **number at a future point**

- What is the expected Lifetime Value of a customer?
- What will total sales be in Q4?
- How long will a patient be in the hospital?
- How many website conversions will be completed in December?
- **How much inventory will be on hand?**



Machine learning ready data

~80% of the project time



Visualize & understand



Clean & transform



Add features

Getting your dataset ready for training

For Qlik AutoML



Turning a business use case into a specific and actionable machine learning question is giving the necessary structure for a successful project.

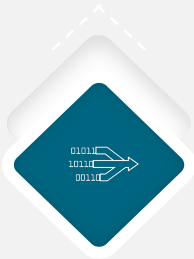
Transform data types

Use the Qlik loading script to define data types



Create new features

Generate new features with the Qlik loading script



Correlation

Explore your data with Qlik Sense to uncover correlations



Class balancing

AutoML provides you with meaningful visualizations to uncover unbalanced classes



Cardinality

AutoML takes care of high cardinality features



Data leakage

AutoML delivers metrics and visualizations to uncover leakage



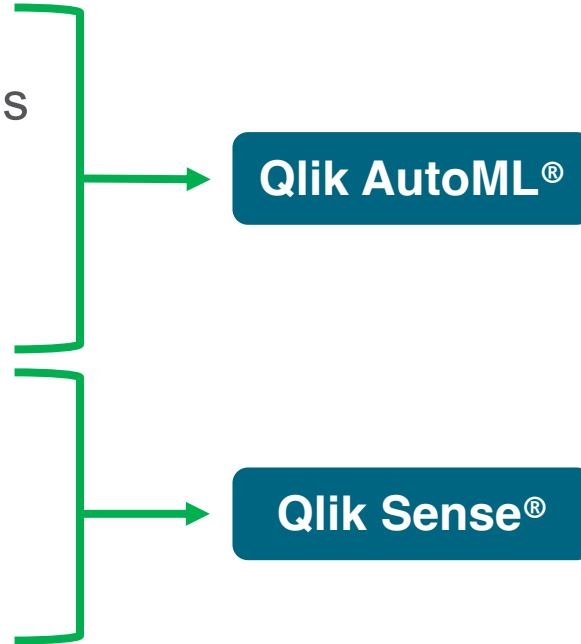
Handling missing values

You can use AutoML to predict missing values

Clean & transform

A lot of steps needed

- Remove null values
- Remove unnecessary columns
- One hot encoding
- Feature scaling
- Split into test and train
- Correct data types
- Remove duplicates
- Correct errors
- Removing outliers



Domain knowledge



Forming the good machine learning question

Qlik Framework

The framework consists of four parts:

- Event trigger
- Target
- Features
- Prediction point

More information:

https://help.qlik.com/en-US/cloud-services/Subsystems/Hub/Content/Sense_Hub/AutoML/machine-learning-framework.htm

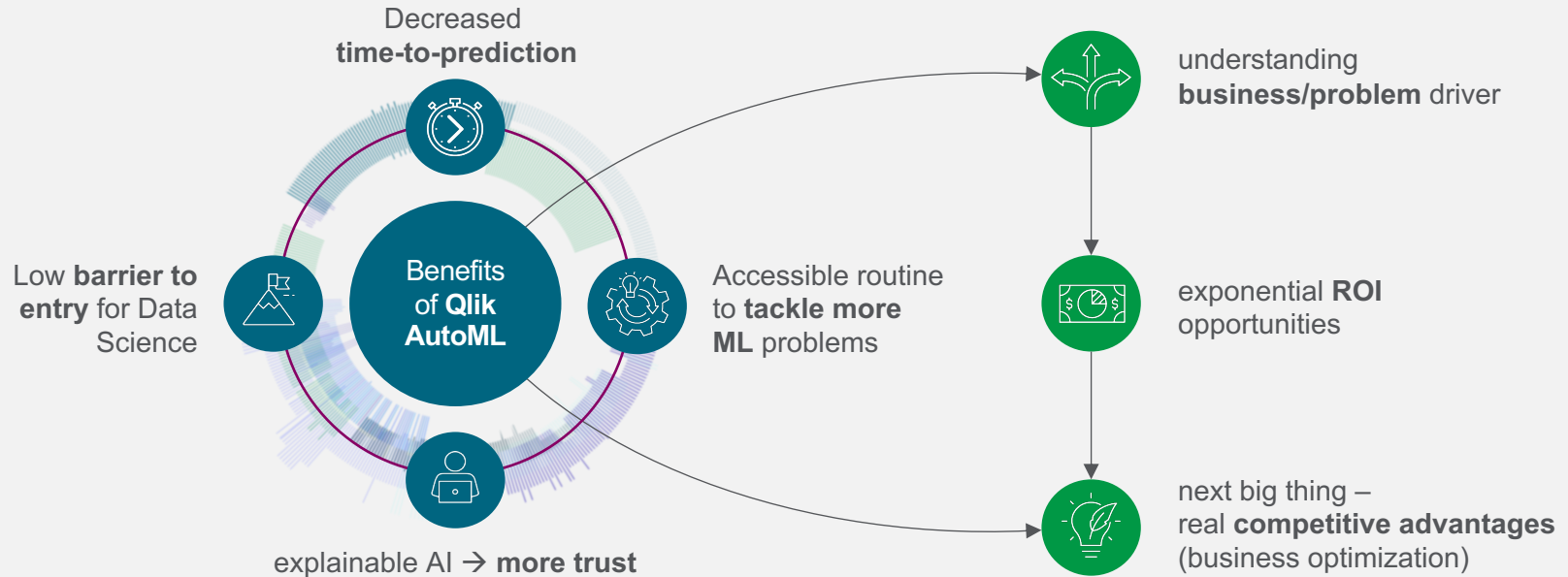
Example

Customer lifetime value

- **Event trigger:** A customer places their first order
- **Target:** Total order amount for the first three years
 - Numeric outcome: Dollar amount
 - The horizon is based on average customer life cycle length
- **Features:** Lead source, First order amount, Discount used on first order (Yes or No), Shipping state, Shipping region, Number of products in the first order
- **Prediction point:** Three months after the first order
- **Machine learning question:** "Predicting three months after a customer's first order, what will their total order dollars be over the next 33 months"

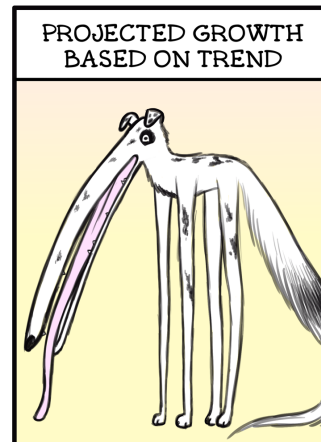
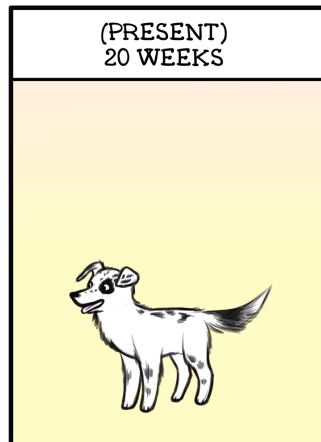
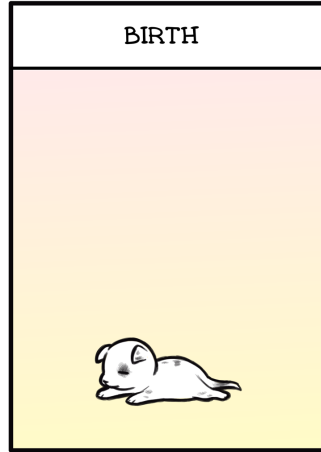
Value of Qlik AutoML

No-code, automated machine learning for analytics teams



→ People are used to ask questions they can answer or might get answers to. Think ahead! Which question you can't answer today?

DOG & PUPPY



Demo

- Qlik AutoML
- Natural Language Capabilities
- Expression Generator



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TO BE CERTAIN.

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Thank you