

AI on the Edge

Wie IoT Devices schlauer werden



Thomas Tomow

- Azure MVP since 2017
- Working at  devoteam | [Alegri](#)
- Focusing on IoT, Cloud, Intelligent Application, ...
- Love community [#communityrocks]
 - Owner of Azure Meetup Konstanz & Region
- Doing Sports
 - Karate (4. DAN)
- Photography



Wer ist Hannes und was ist sein Problem?

- Bild von Hannes



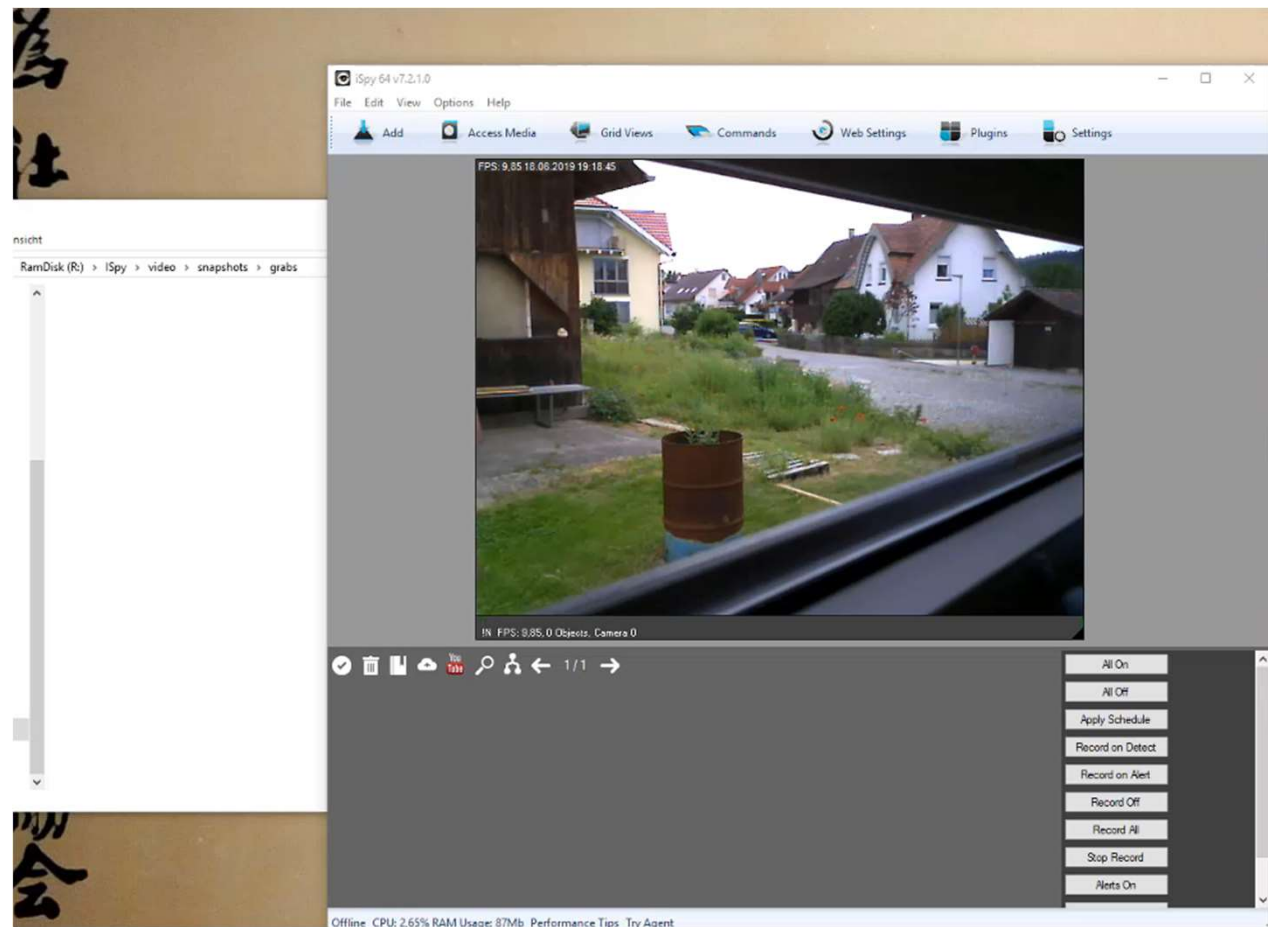
Hannes' erster Anlauf



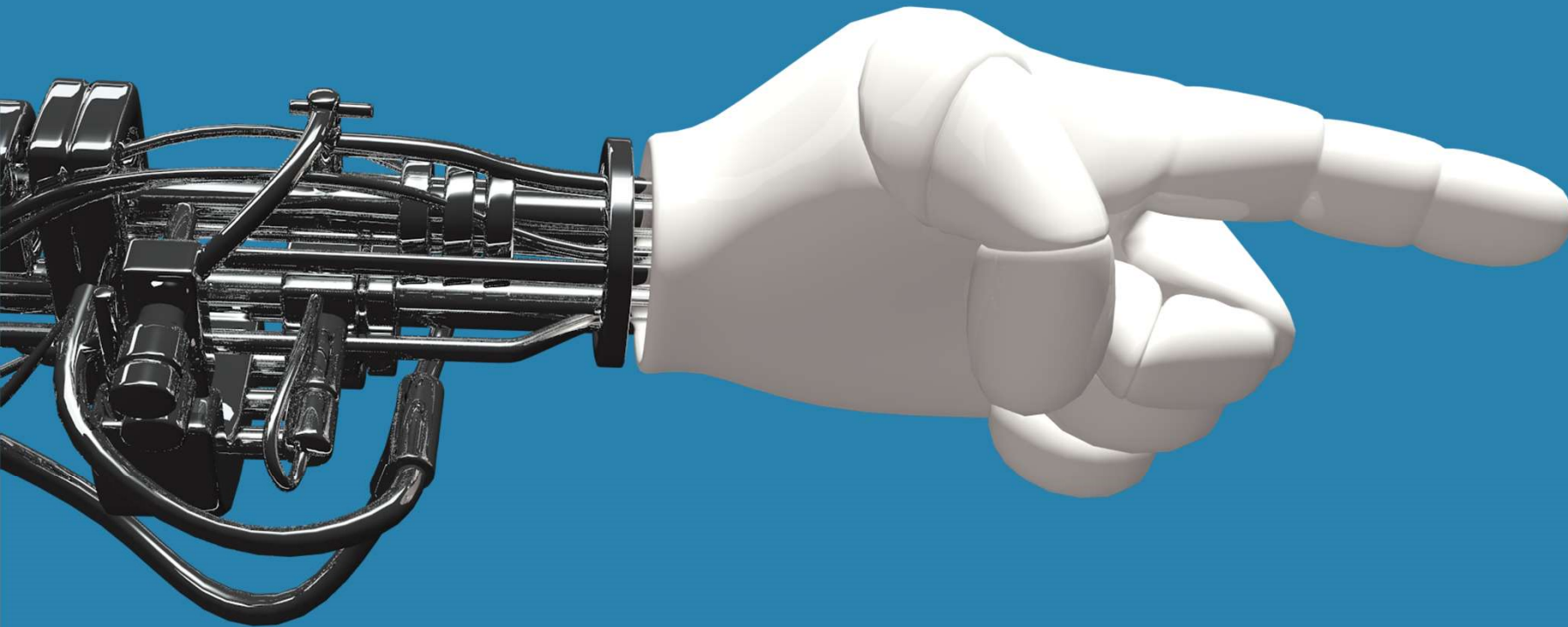
Baukastenlösung – à la ISpy



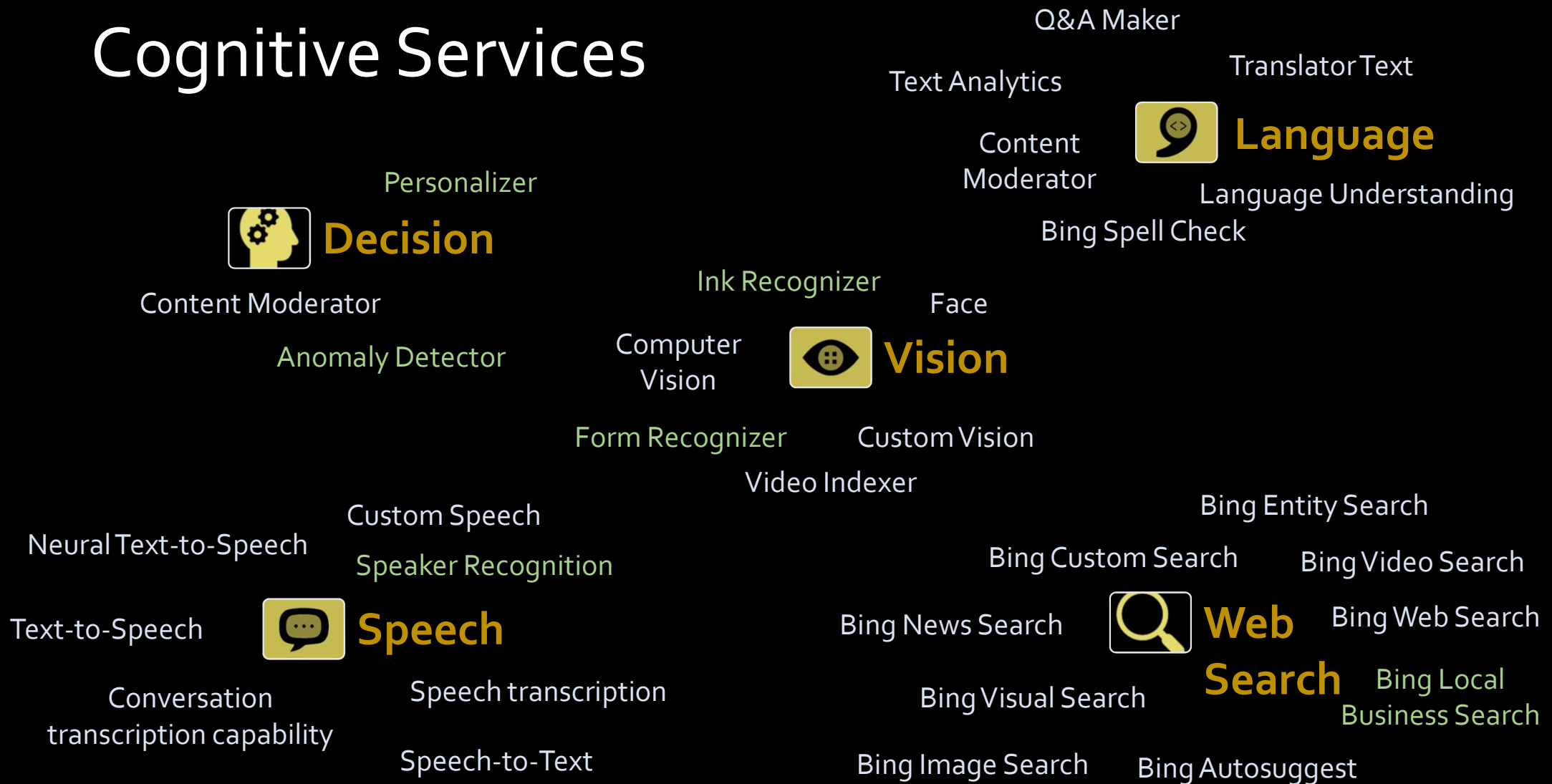
Hannes' Stand der Dinge



Hannes bekommt einen Tipp



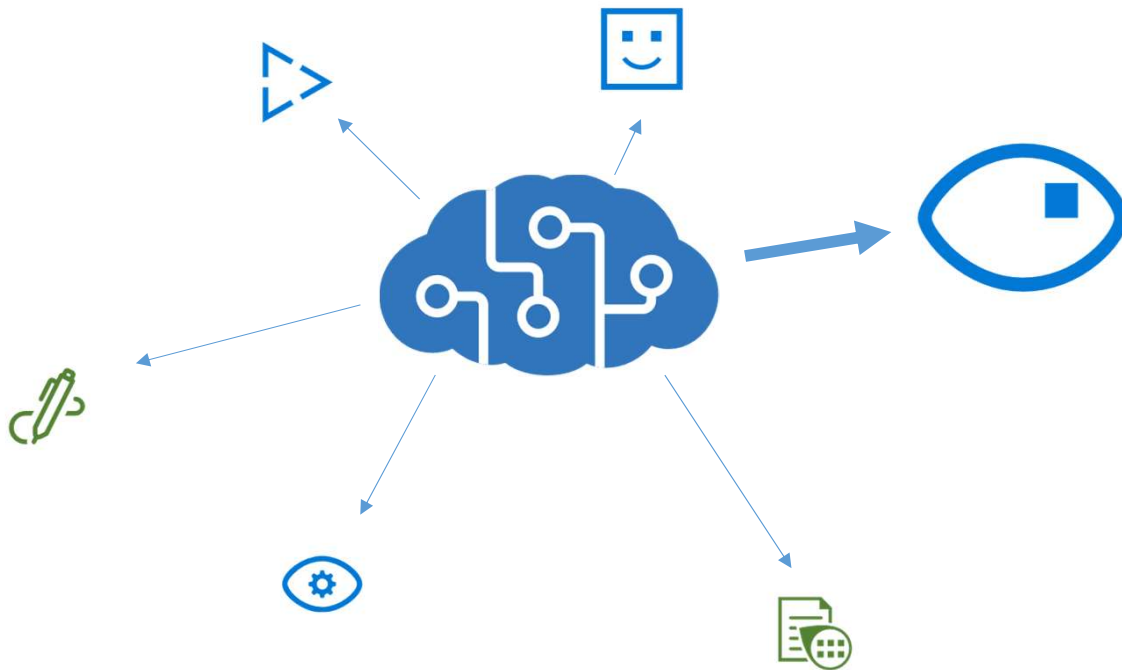
Cognitive Services



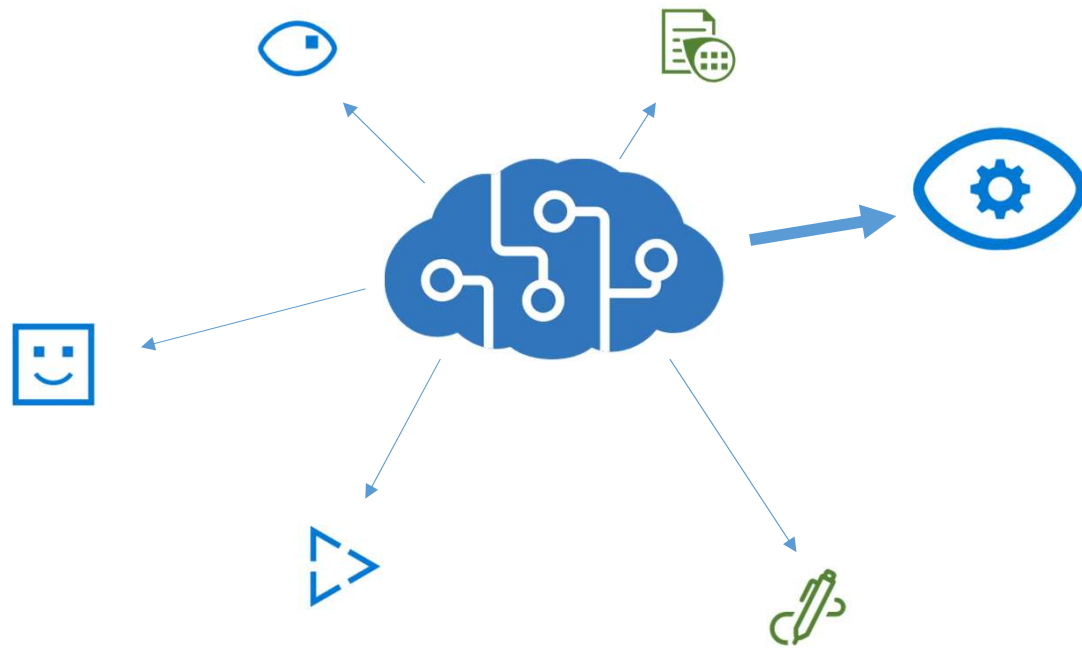
Vision im Fokus von Hannes

Computer Vision

- Vortrainierte Modelle
- Szenenanalyse, Objekte,...
- Output:
 - Beschreibung der Szene
 - Tags
 - Wahrscheinlichkeiten
 - Kategorien



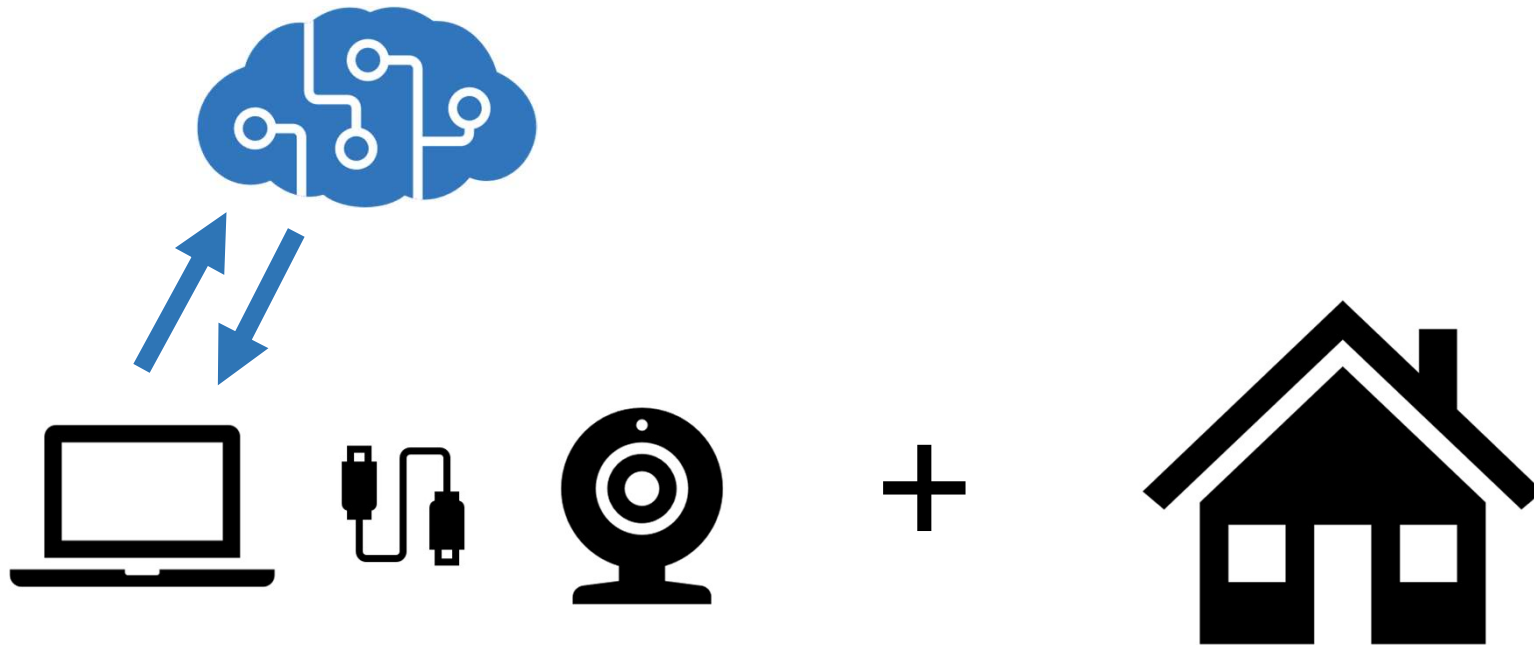
Vision im Fokus von Hannes



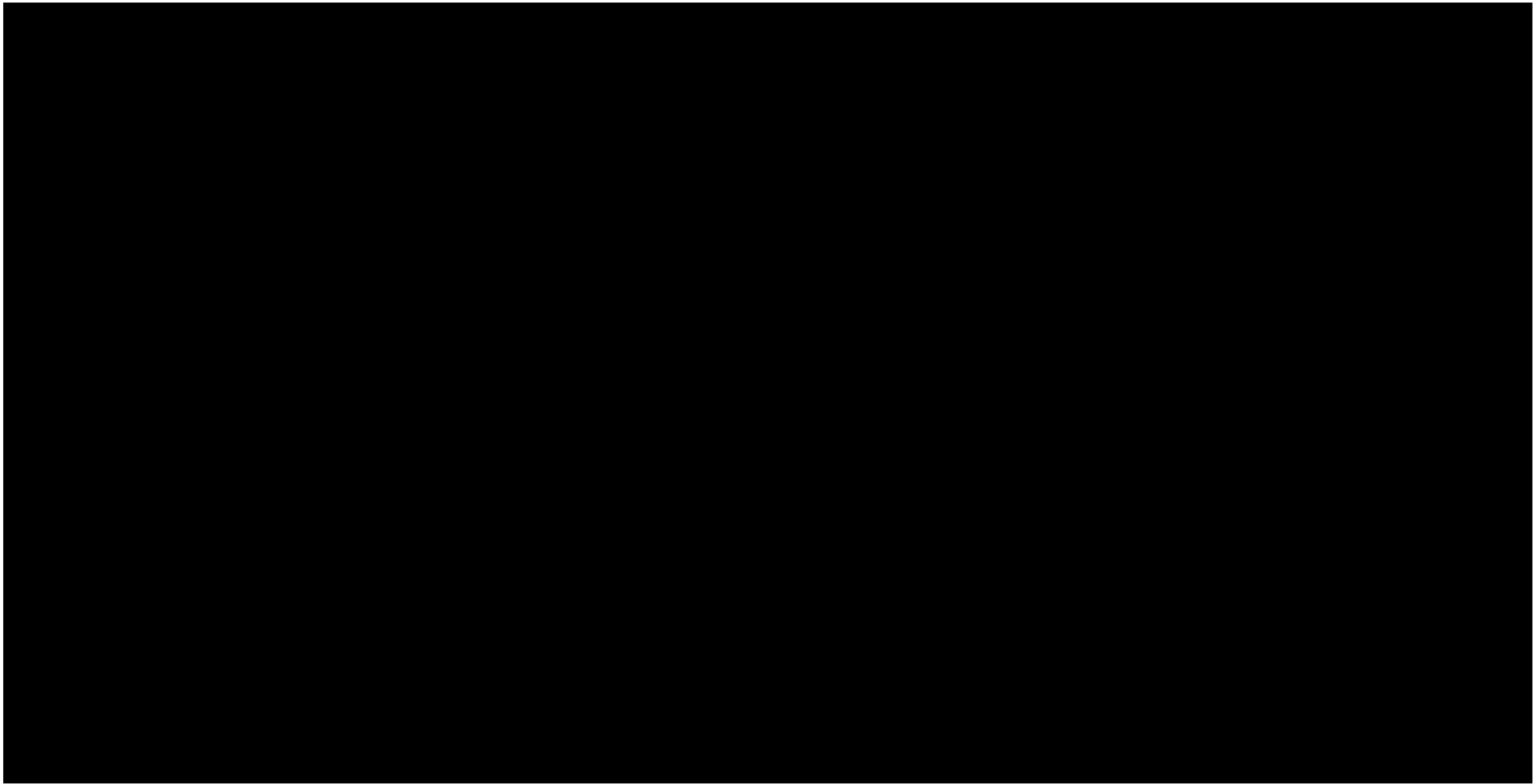
Custom Vision

- Vortrainierte Modelle
- Erweiterbar mit eigenen Inhalten
- Output:
 - Klassifikationstags
 - Bounding Boxes
 - Wahrscheinlichkeiten

Hannes erweitert seine Baukastenlösung



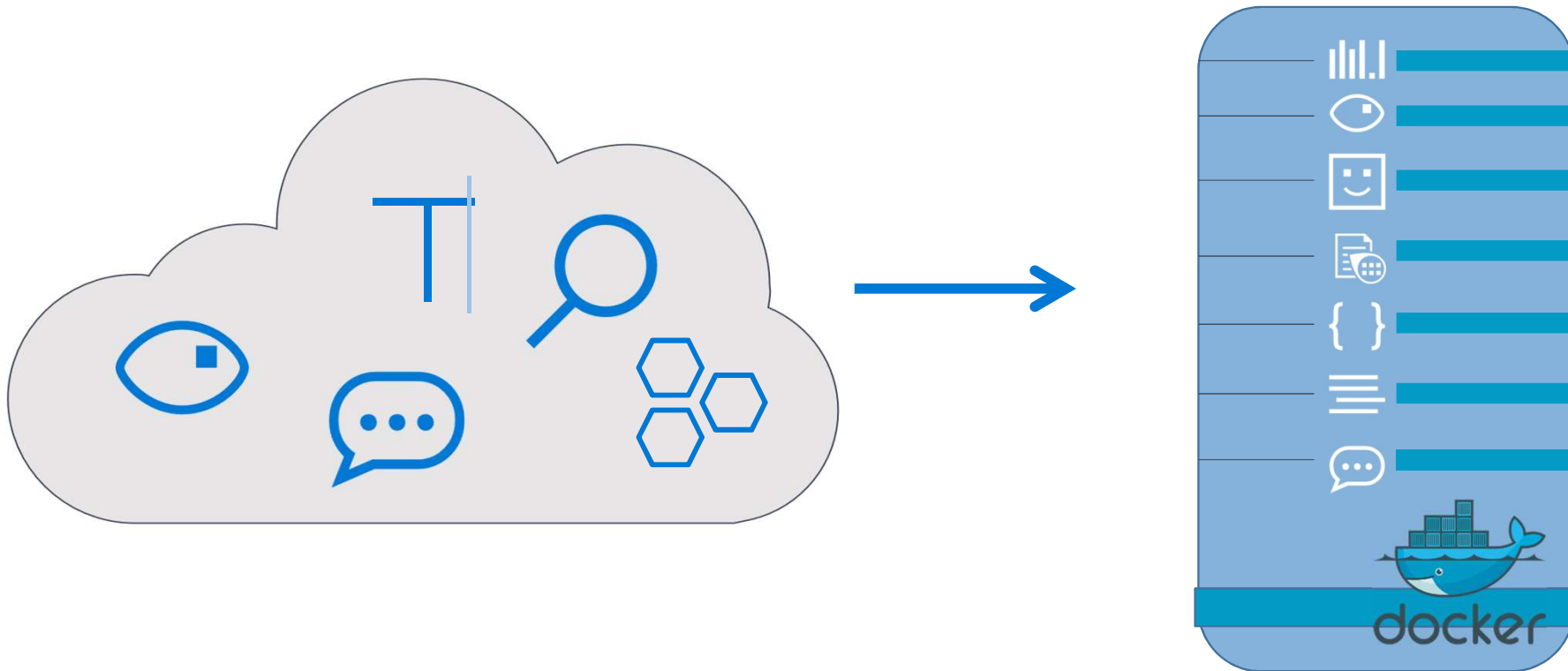
Demo



Hannes muss umdisponieren

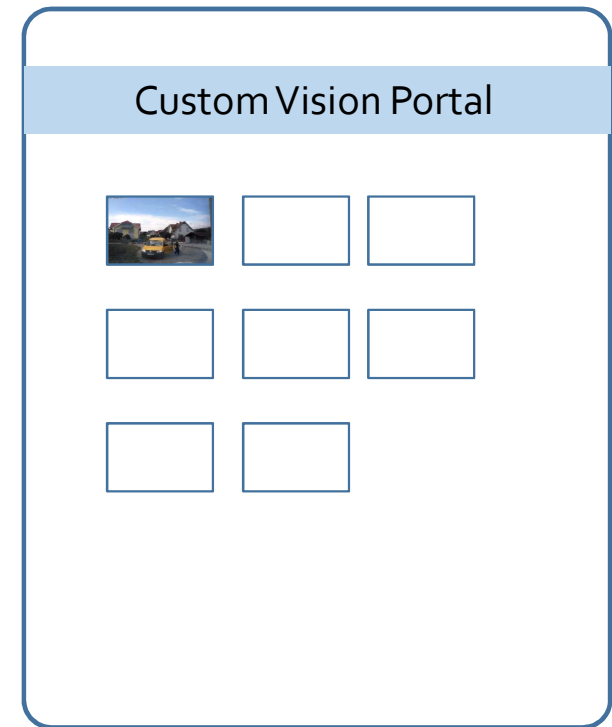


Containerized Cognitive Services



Custom Vision

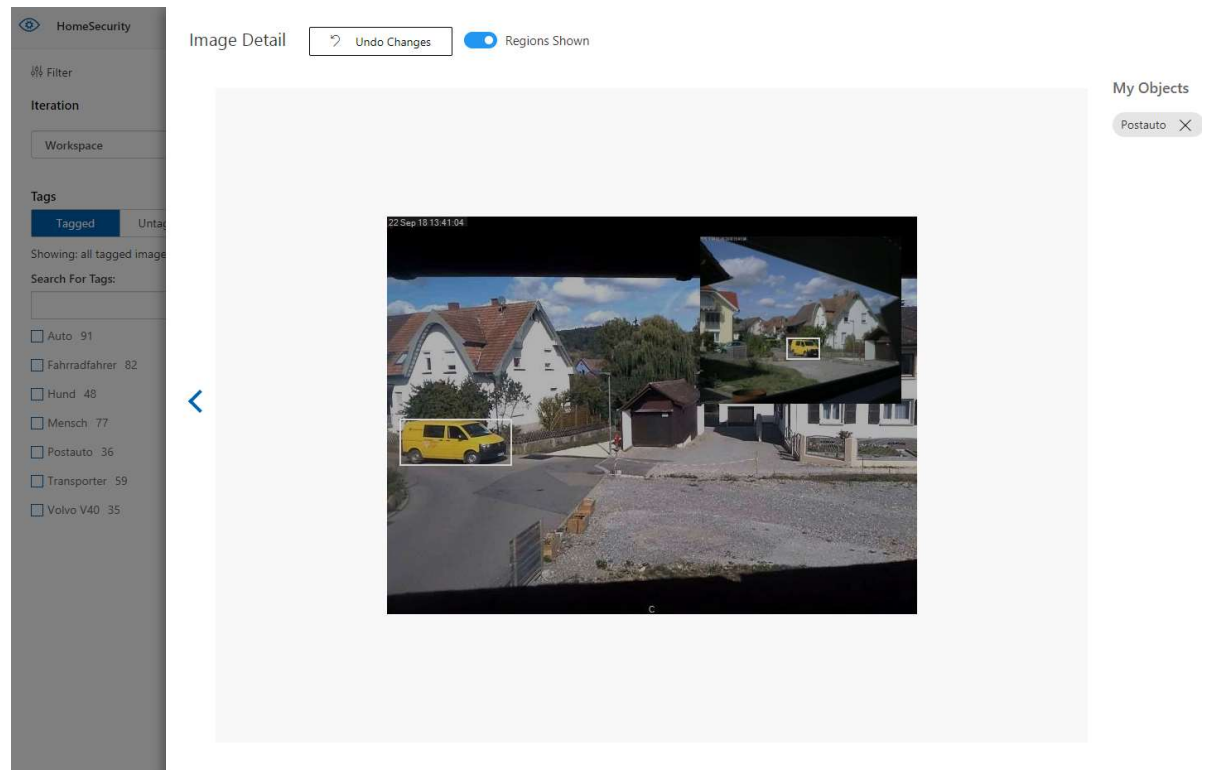
1. Bilder hochladen



<https://www.customvision.ai/>

Custom Vision

2. Objekte markieren & Tagnamen vergeben



<https://www.customvision.ai/>

Custom Vision

3. Training & Evaluation starten

The screenshot displays the Custom Vision interface for a project named 'HomeSecurity'. It shows the 'Performance' tab with metrics for Iteration 9. A 'Choose Training Type' dialog is open, showing 'Advanced Training' selected with a 1-hour budget. The performance metrics for Iteration 9 are: Precision 78.2%, Recall 58.5%, and mAP 72.4%. Below these, a 'Performance Per Tag' table is shown.

Choose Training Type

Training Types ①

☐ Fast Training

☒ Advanced Training

In most cases, the more time you select the better the model will be. You're charged based on the compute time used to train your model, so choose your budget based on your need.

Training budget: 1 hour ①

☐ Send me an email notification after training completes

Email address
foto_san@live.com

Train

HomeSecurity

Iterations

Probability Threshold: 50% ①

Overlap Threshold: 30% ①

Iteration 9
Advanced Trained on: 26.3.2019
with General (compact) domain.
Training Budget: 1 hour

Iteration 8

✓ Publish Prediction URL Delete Export

Iteration 9
Finished training on 26.3.2019, 09:03:38 using General (compact) domain

Precision ① 78.2%

Recall ① 58.5%

mAP ① 72.4%

Performance Per Tag

Tag	Precision ^	Recall	A.P.	Image count ⚠
Auto	95.7%	68.8%	94.4%	91
Mensch	87.5%	58.3%	72.4%	77
Fahrradfahrer	84.2%	53.3%	69.2%	82
Hund	71.4%	35.7%	61.6%	48
Transporter	64.3%	60.0%	61.3%	59

<https://www.customvision.ai/>

Custom Vision

4. Export als Docker Container

Choose your platform

DF **Dockerfile**

ARM (Raspberry Pi 3)

Choose a version

Linux

Windows

ARM (Raspberry Pi 3)

How to use?

[Docker documentation](#)

[Licenses](#)

Choose your platform

iOS

CoreML

iOS 11

TF

TensorFlow

Android

ONNX

ONNX

Windows ML

DF

Dockerfile

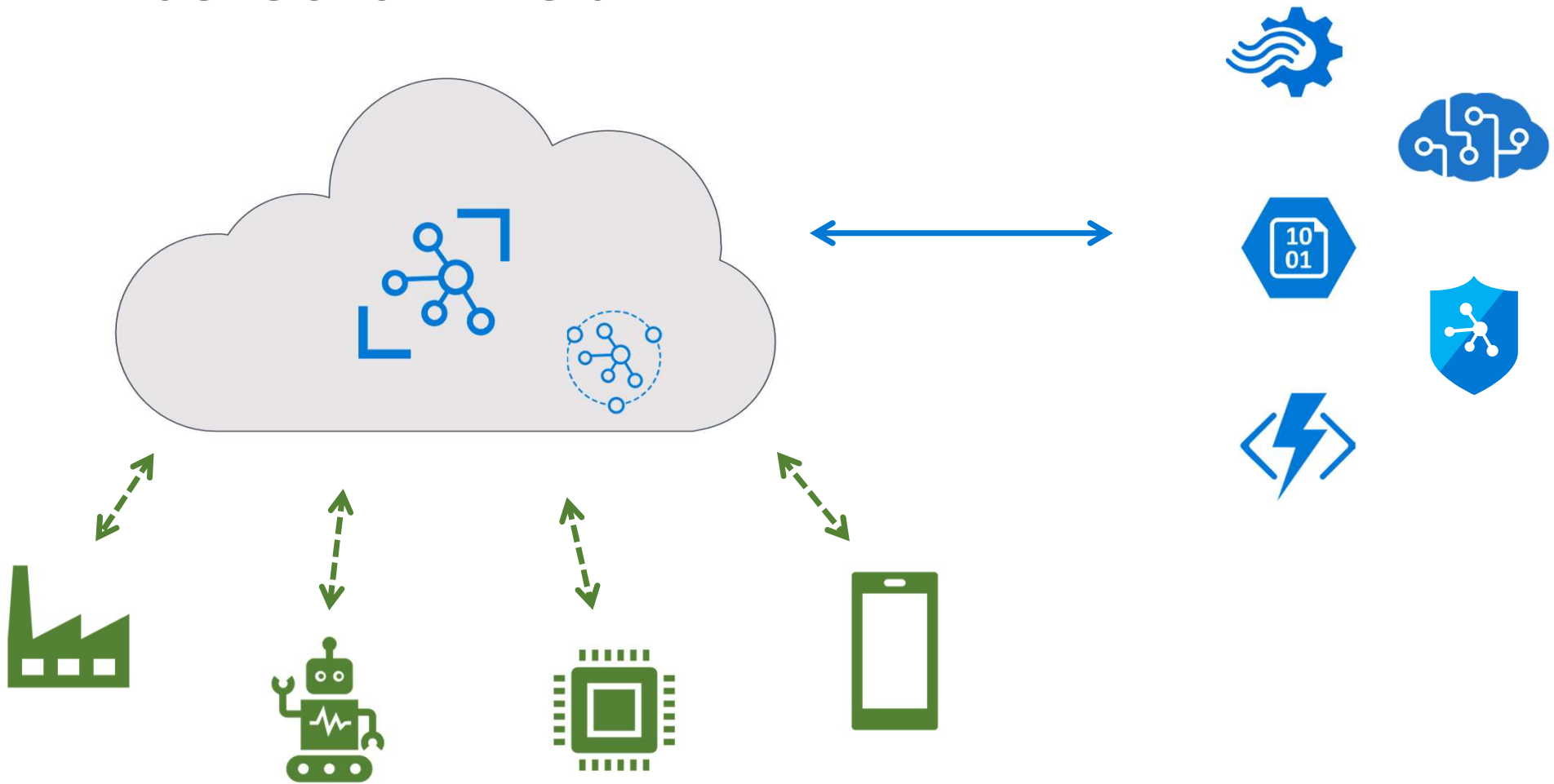
Azure IoT Edge, Azure Functions, AzureML

VAIDK

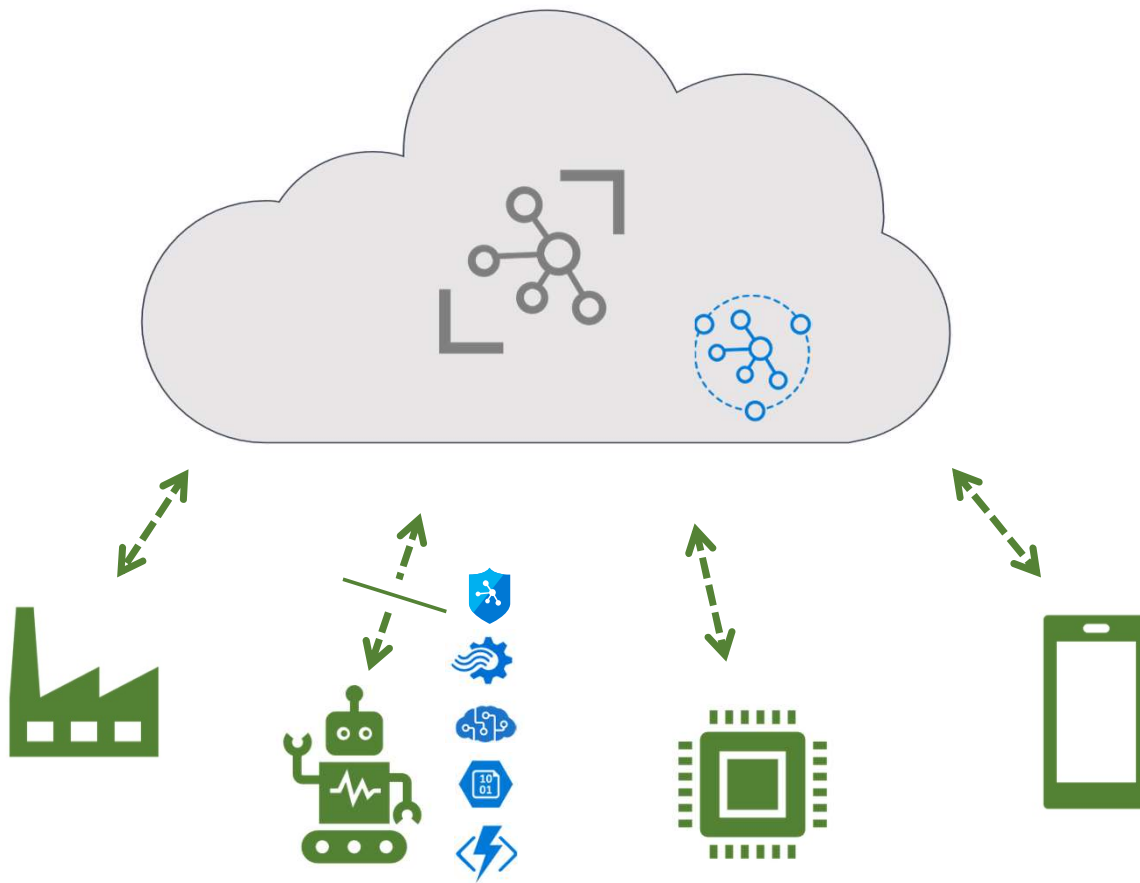
ision AI Dev Kit

<https://www.customvision.ai/>

Was ist IoT Hub?



Was ist IoT Edge?



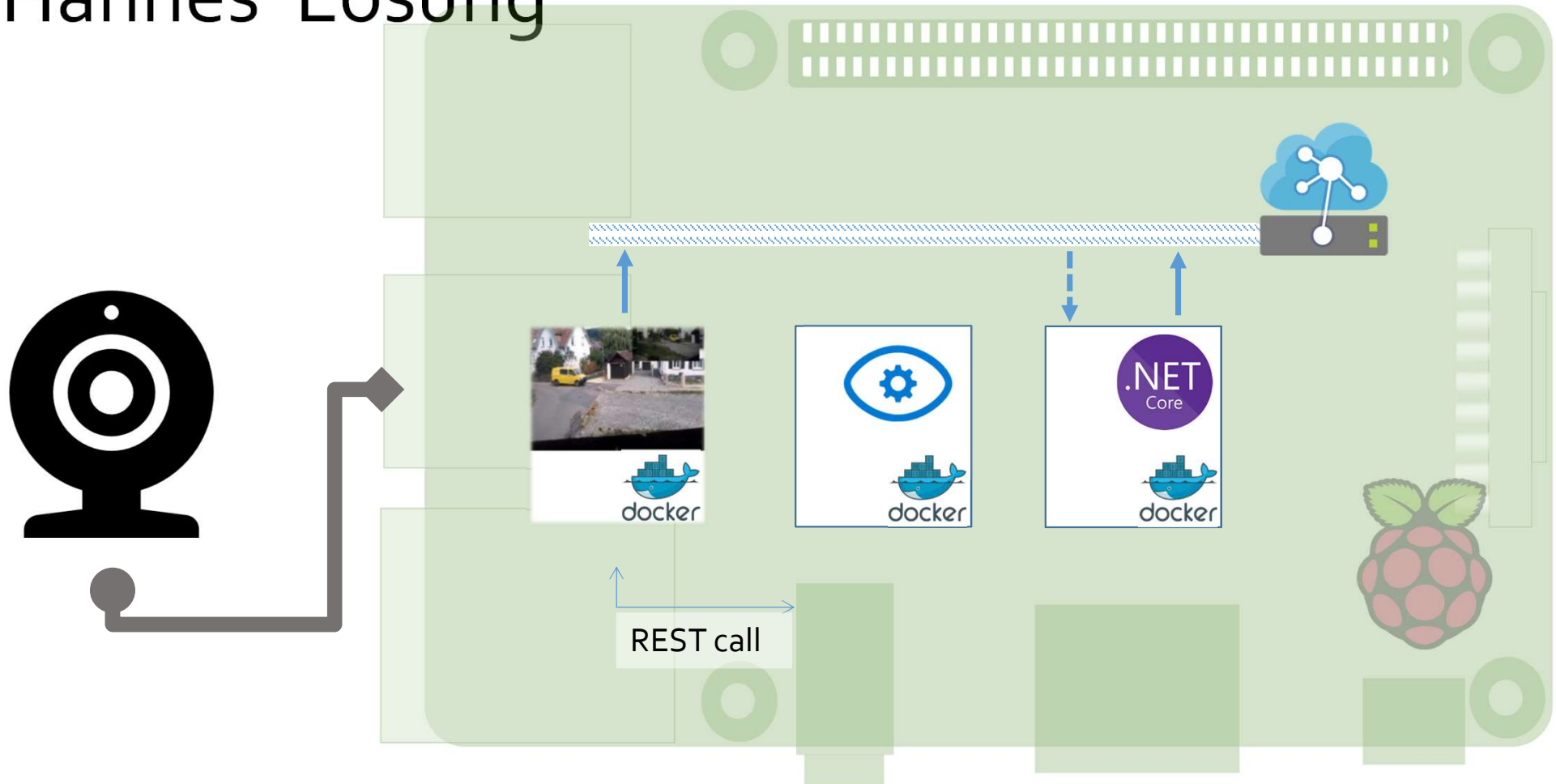
Eigenschaften

- Offline oder sporadisch Online
- Vollständig modular
- Interne Nachrichtenbasierte Kommunikation

Container Deployment

- Azure Services On Edge möglich
- Jede „containerizable“ App offline
- IoT Hub Device Management & Device Provisioning Service

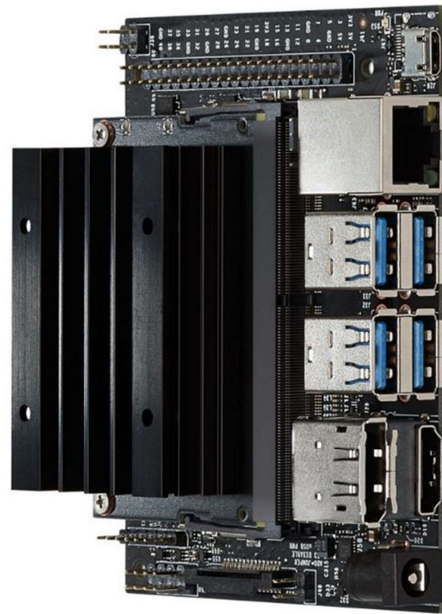
Hannes' Lösung



Weiteres Werkzeug für Hannes



Vision AI DevKit Camera

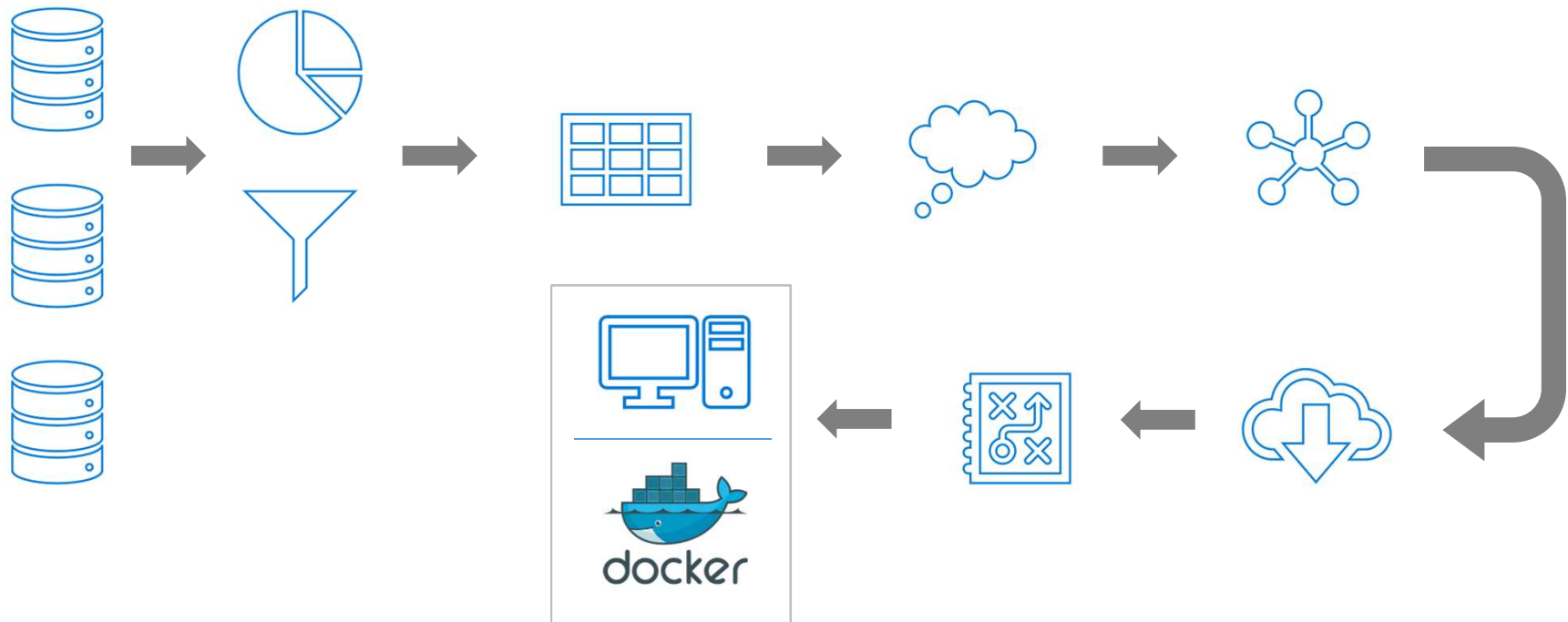


NVIDIA Jetson Nano



Intel Movidius
Neural Compute Stick

Aussichten



Möglichkeiten

Azure Machine Learning Services

- Juniper Notebooks
- Python 2+3, R, F#
- AutoML
- AI-DevOps Infrastruktur



.Net Development

- ML.NET (z.B. C#)
- MachineLearning Packages
 - UWP - NameSpace
 - NuGet
- AzureML (CLI)

ML.NET

Cognitive Services



Vision

- Bildtagging, Thumbnails
- OCR, Handschriftenerkennung
- Erkennen von gemalten Bildern
- Gesichtserkennung
- Emotionserkennung
- Video Insights
- Bilder und Video Moderation



Speech

- S2T, T2S (Transkription)
- Lautstärke, Rauschen Transkription
- Authentifikation
- Realzeit-Übersetzung



Language

- Kontextanalyse
- Absichten Erkennung
- Sentiment Analyse, Schlüsselworte
- Übersetzungen
- Text Moderation
- Rechtschreibprüfung



Knowledge

- Bot und Q&A Services
- Verstärktes Lernen von personalisiertem Inhalt



Search

- Autom. Suchvorschläge
- Umfassende Ergebnisse von News, Video und Bilder
- Informationsgewinnung
- Angepasste/Zugeschnittene Suche

Empfehlungen & Inhaltsangaben

- <https://azure.microsoft.com/de-de/services/iot-hub/>
- <https://azure.microsoft.com/de-de/services/iot-edge/>
- <https://channel9.msdn.com/Shows/Internet-of-Things-Show/Custom-Vision-on-IoT-Edge>
- <https://github.com/buildaidemos/demos>
- <https://azure.microsoft.com/en-us/blog/a-deep-dive-into-what-s-new-with-azure-cognitive-services/?cdn=disable>

Bilder von www.pixabay.com & meine eigenen

Merci



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Github: [toto_san](#)

