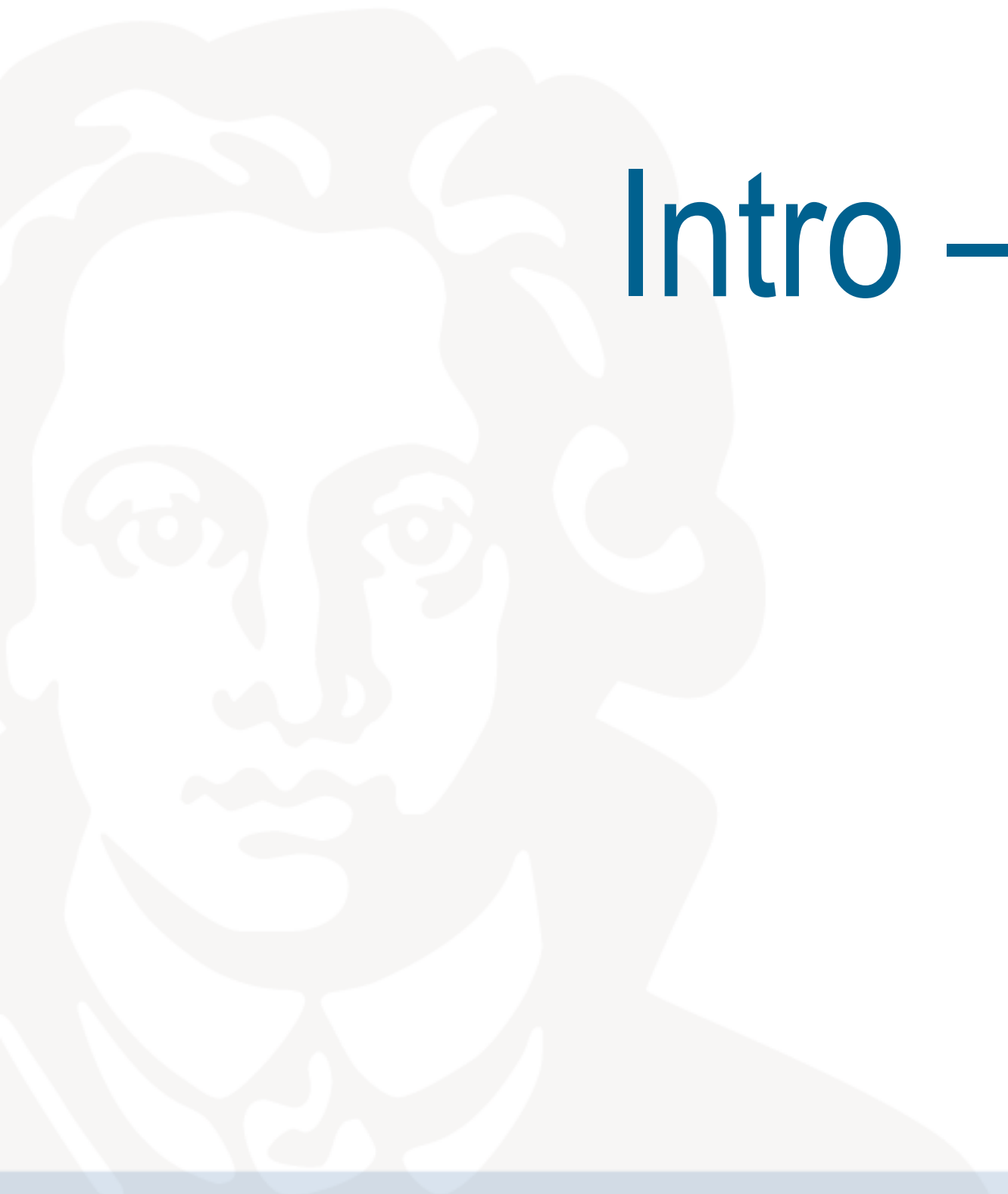
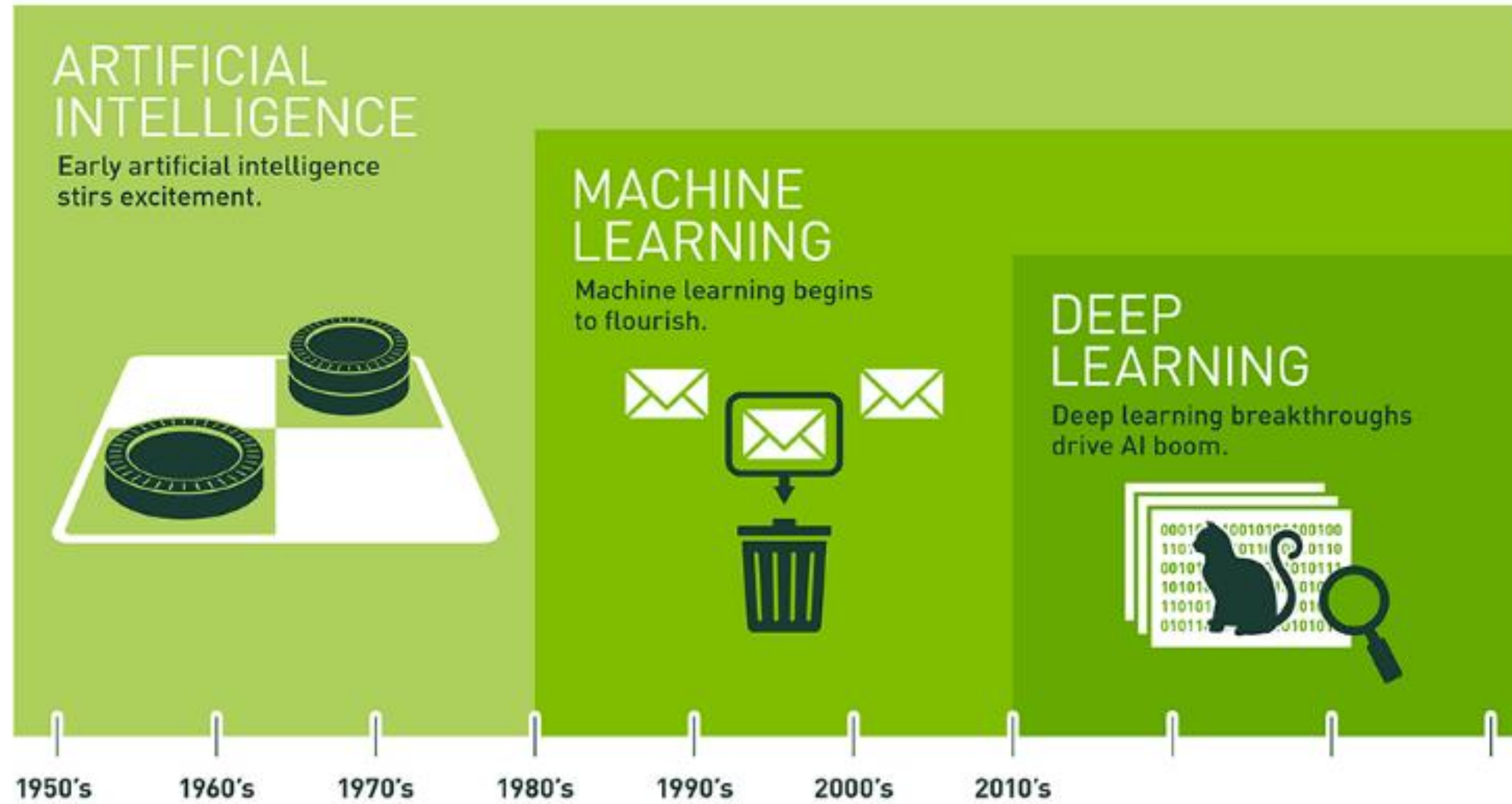


Tobias Weis

ML Praktikum 17/18

Intro – ML in (your) daily life





Since an early flush of optimism in the 1950s, smaller subsets of artificial intelligence – first machine learning, then deep learning, a subset of machine learning – have created ever larger disruptions.

ML in daily life

Recommender systems

Medicine/Pharma

E-commerce

Finance, Fraud detection

Smart home devices

Video games

Customer support, chat bots

Machine translation

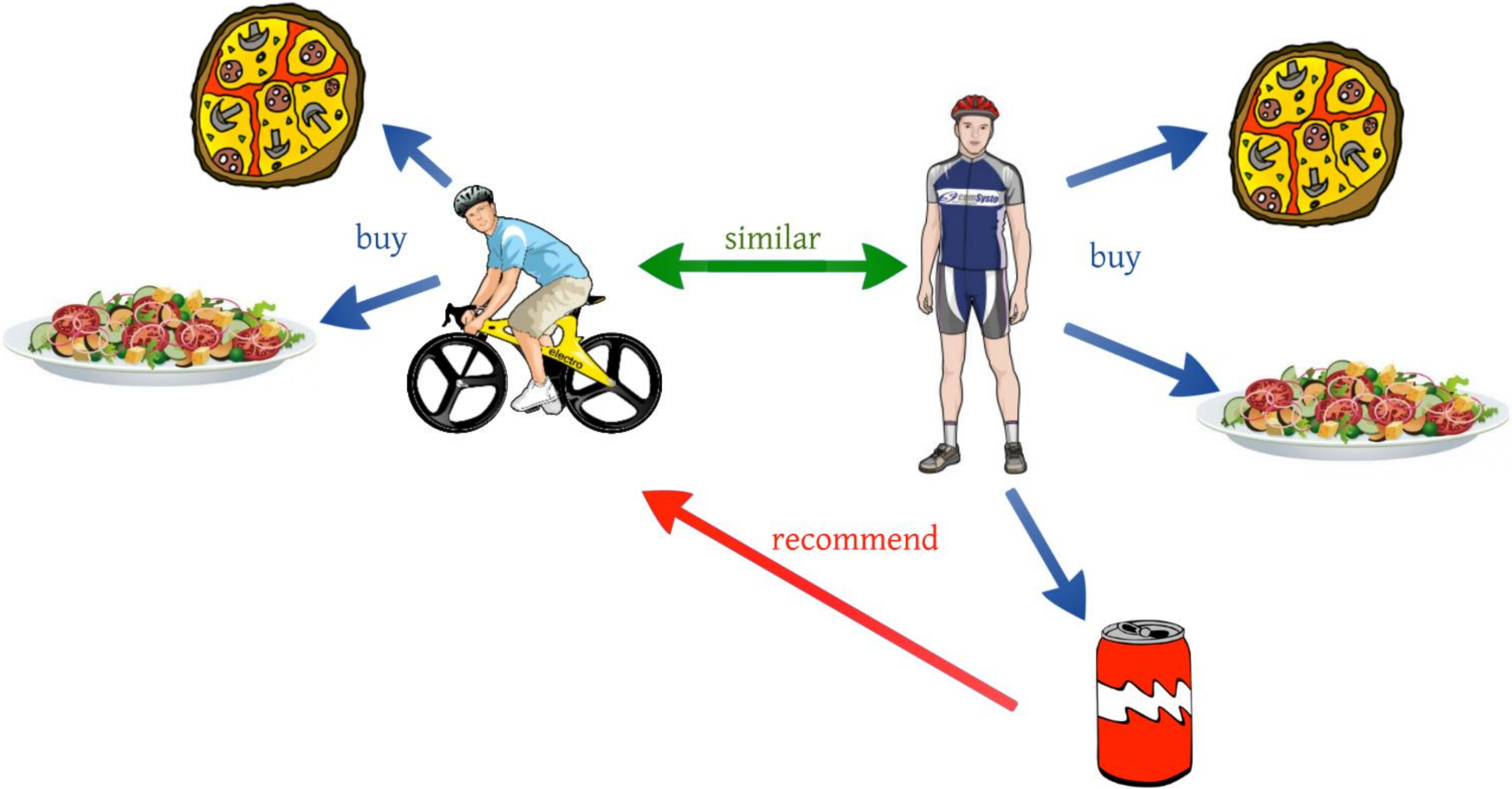
Smart cars

Surveillance, Security

Recruiting, Job market

Robot control

Recommender systems



[<https://blog.soton.ac.uk/smallworld/2015/04/25/game-theory-and-recommendation-systems/>]

Recommender systems - Examples

Inspiriert durch Ihre Wünsche [Mehr](#)

SainSmart DSO Notell Oscilloscope

Newest DSO Nano DSO211
Upgrade of DSO201

Empfehlungen für Sie: Gewerbe, Industrie & Wissenschaft

4 Pack

Wird oft zusammen gekauft

Gesamtpreis: EUR 119,97

Alle drei in den Einkaufswagen

Einige dieser Artikel sind schneller versandfertig als andere. [Details anzeigen](#)

- ✓ **Dieser Artikel:** SainSmart Nano Arm DS202 Tragbare Mini Handkamera Digital
- ✓ SainSmart Sonde für Digital Oszilloskop DSO201 DSO202 DSO203 Oszilloskop
- ✓ BlueBeach® 2 Stück Adapter Konverter MCX Stecker zu BNC Buchse für Antenne

GOOGLE

Google-Suche

Auf gut Glück!

Everything is a Recommendation

Ranking

ROWS

Over 80% of what members watch comes from our recommendations

Recommendations are driven by Machine Learning Algorithms

ZITE
INTELLIGENT MAGAZINE

„We use math to get you dates“

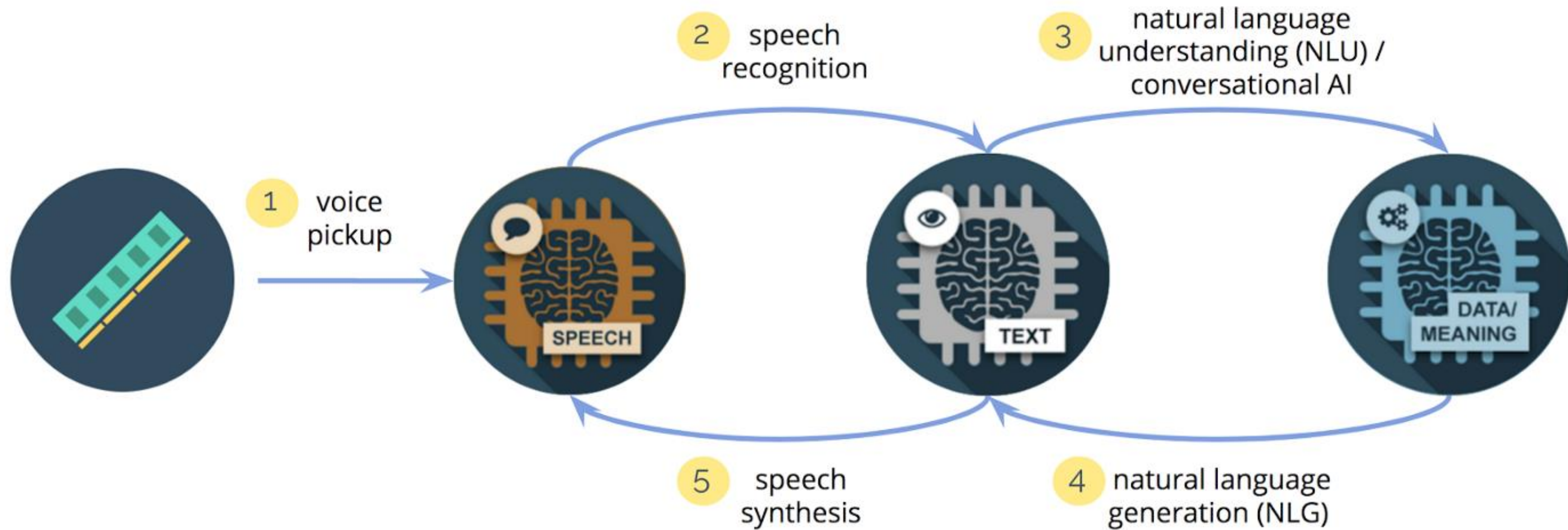
[amazon.de]
[https://www.okcupid.com/about]

[https://www.slideshare.net/DataStax/netflix-recommendations-using-spark-cassandra]

Personalized assistants - NLP



Personalized Assistants – NLP and Speech recognition



* There may be substitutions and more complicated functionalities within NLU/conversational AI in the future.

Medicine/Pharma

Disease identification / diagnosis

Personalized treatments

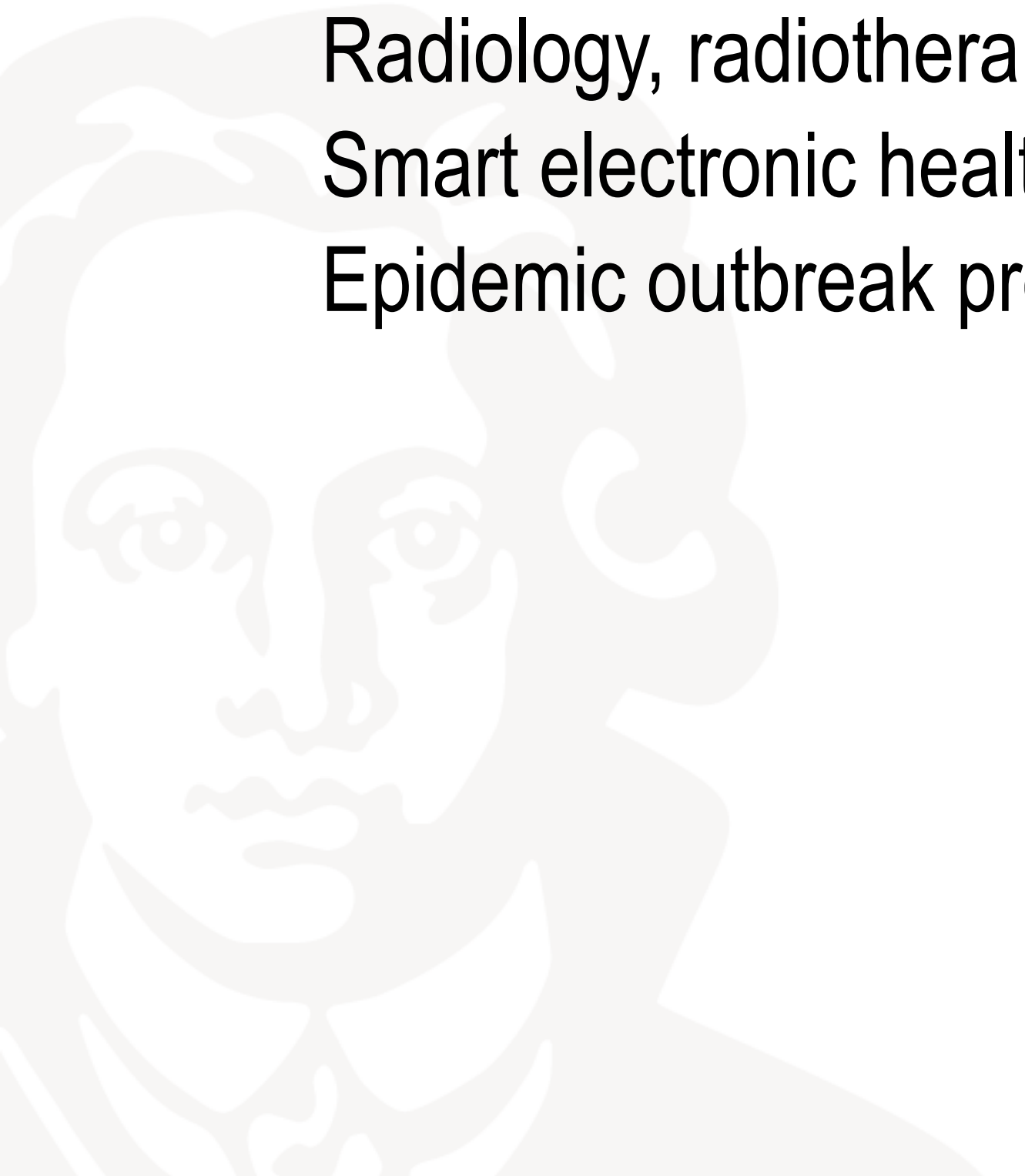
Drug discovery

Clinical trial research

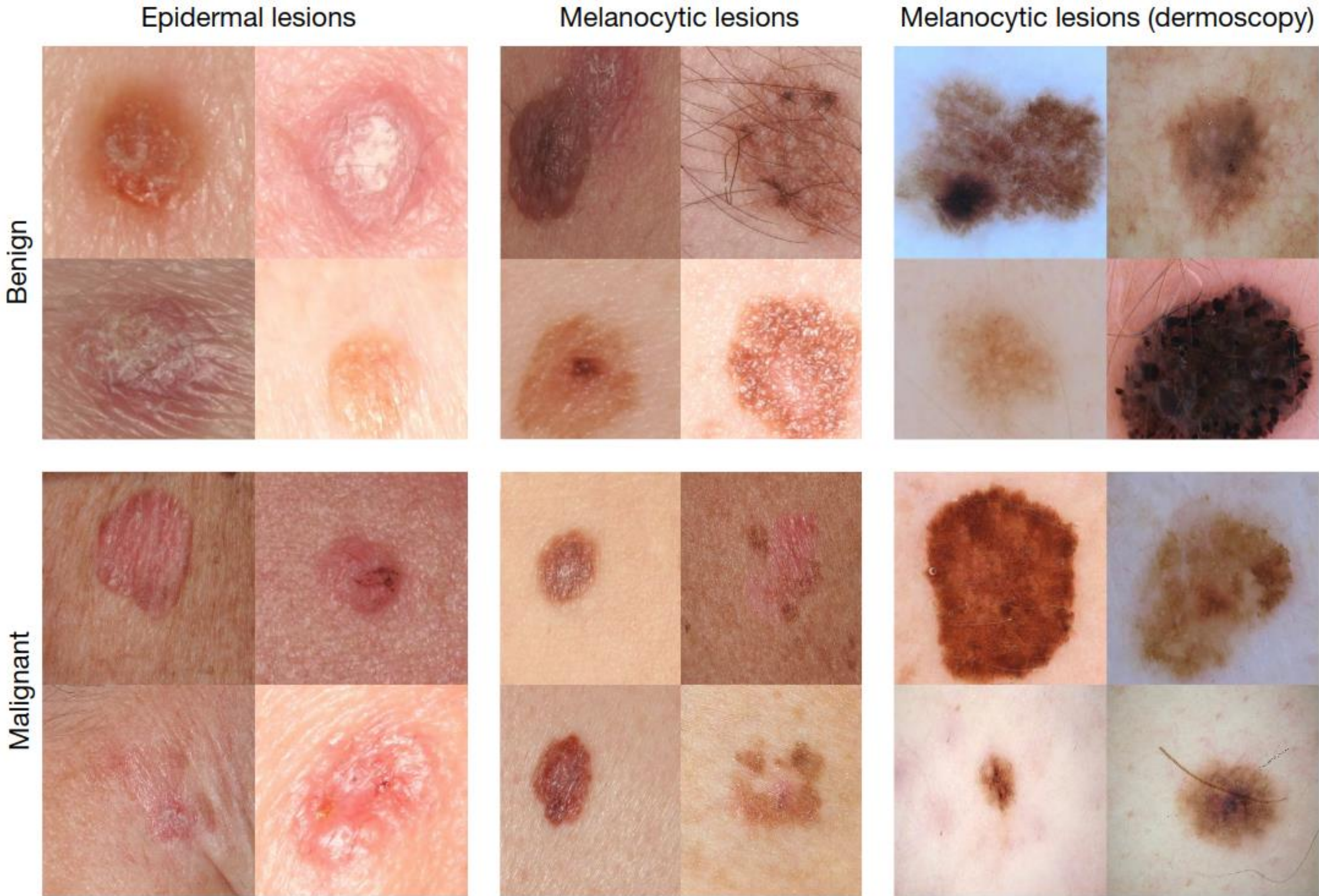
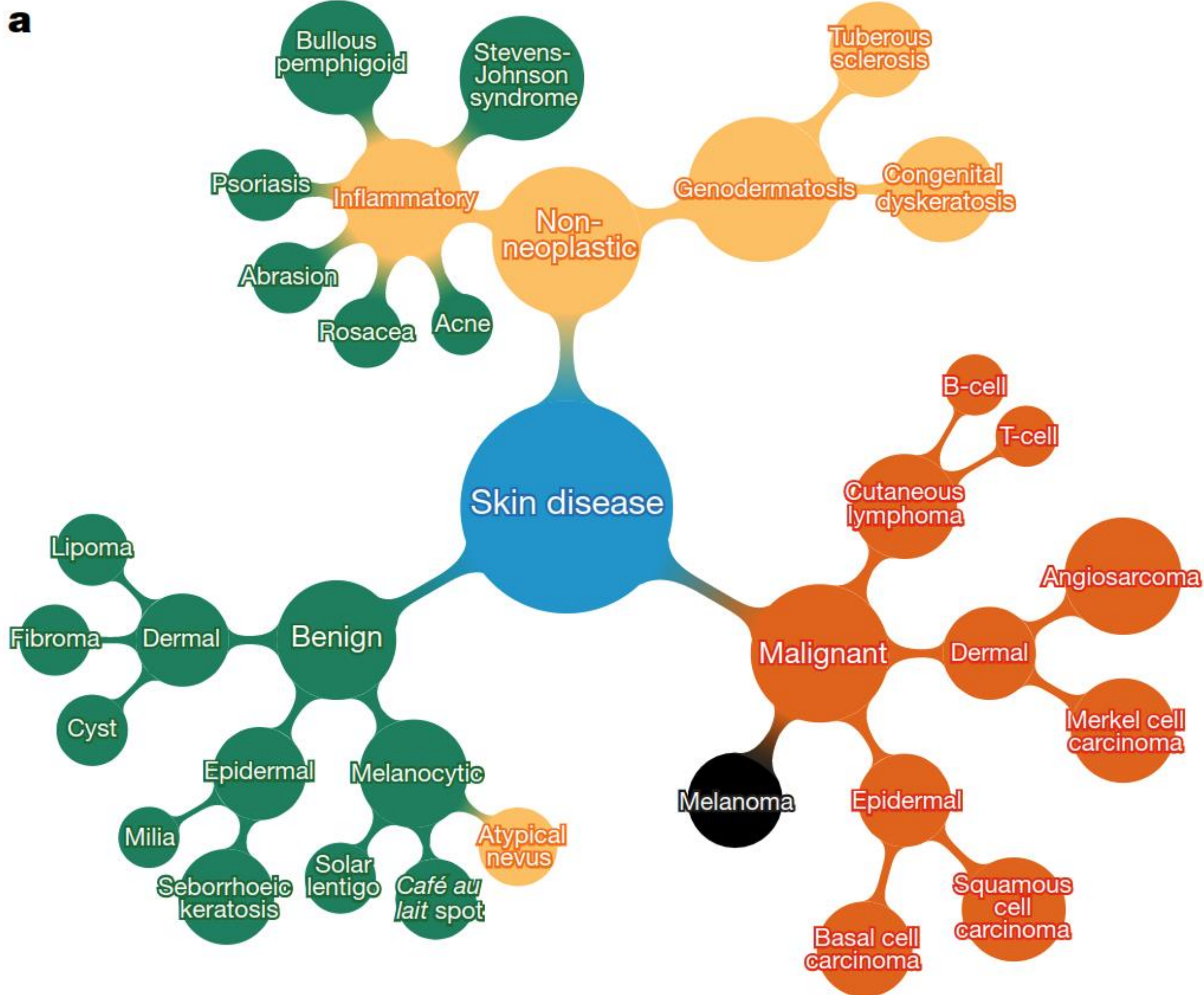
Radiology, radiotherapy

Smart electronic health records

Epidemic outbreak prediction



Dermatologist-level classification of skin cancer with deep neural networks



Medicine - Diagnosis

“Face2Gene is a suite of phenotyping applications that facilitate comprehensive and precise genetic evaluations.” [face2gene.com]



The advertisement features a doctor in a white coat and stethoscope examining a young child. The doctor is holding a smartphone that displays the Face2Gene application interface, which shows a close-up of the child's face with a vertical line down the center, indicating facial analysis. The background is a clean, clinical setting.

FACE2GENE
Developed by FDNA

- CLINIC
- FORUMS
- LIBRARY
- LABS
- RESEARCH
- ACADEMY

FACE2GENE .COM

EU

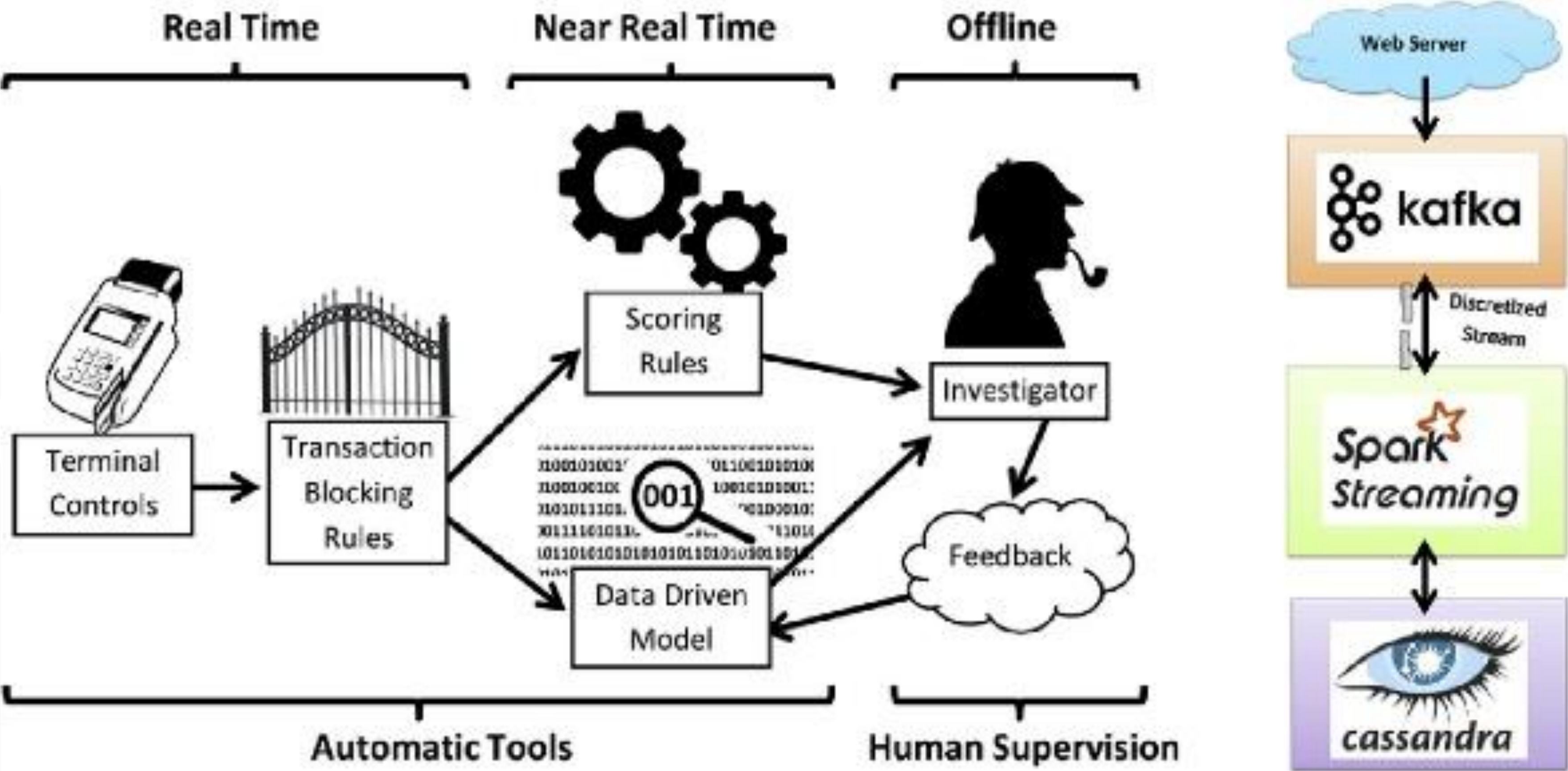
Smart Phenotyping.
Better Genetics.

E-Commerce

- All areas of Search (ranking, query understanding, query expansion, related queries)
- Recommendation (you may like ...)
- Merchandising (this item goes with this item)
- Image recognition and understanding
- Concept extraction
- Sentiment and trend analysis
- Shipping cost and time estimation
- Inbound and outbound logistics optimization
- All manner of fraud detection and prevention (a long list here)
- Classification
- Pricing
- Supply and demand analysis and forecast
- Various scheduling and optimal resource allocation

Fraud detection

SCARFF: A scalable framework for streaming credit card fraud detection with spark



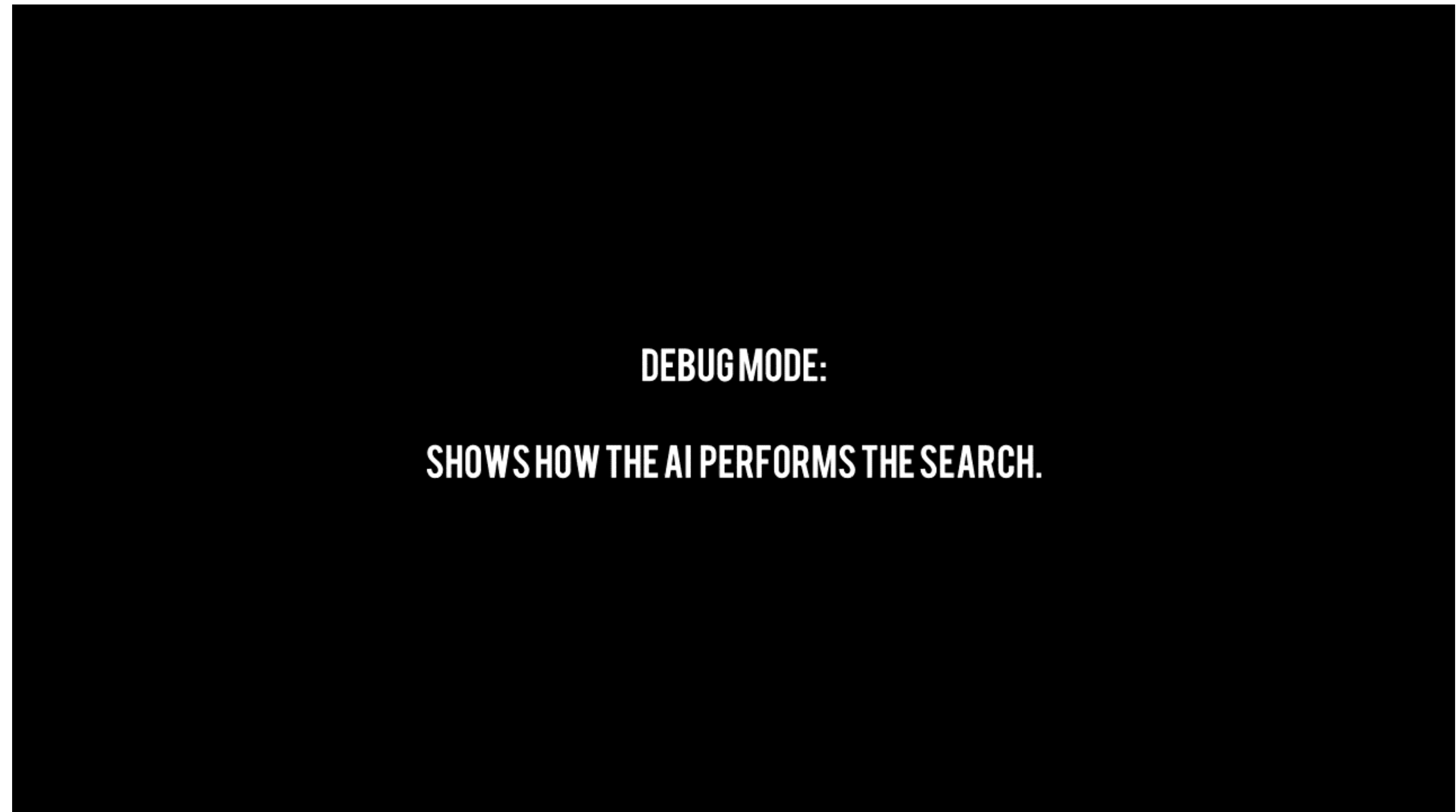
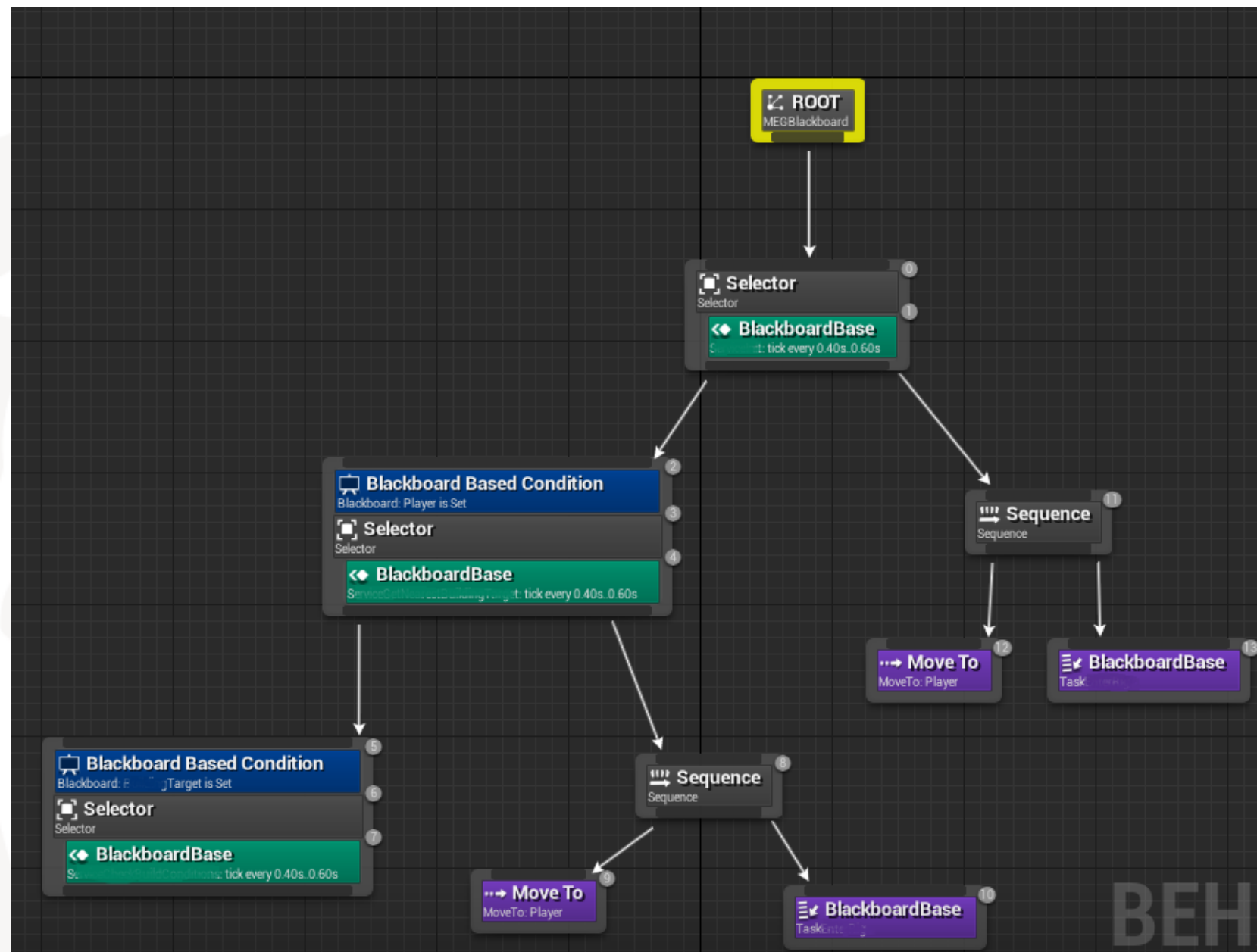
Smart Home



<http://blog.airpatrol.eu/wp-content/uploads/2016/10/bigstock-Smart-Home-103718372-1200x800.jpg>

Video Games

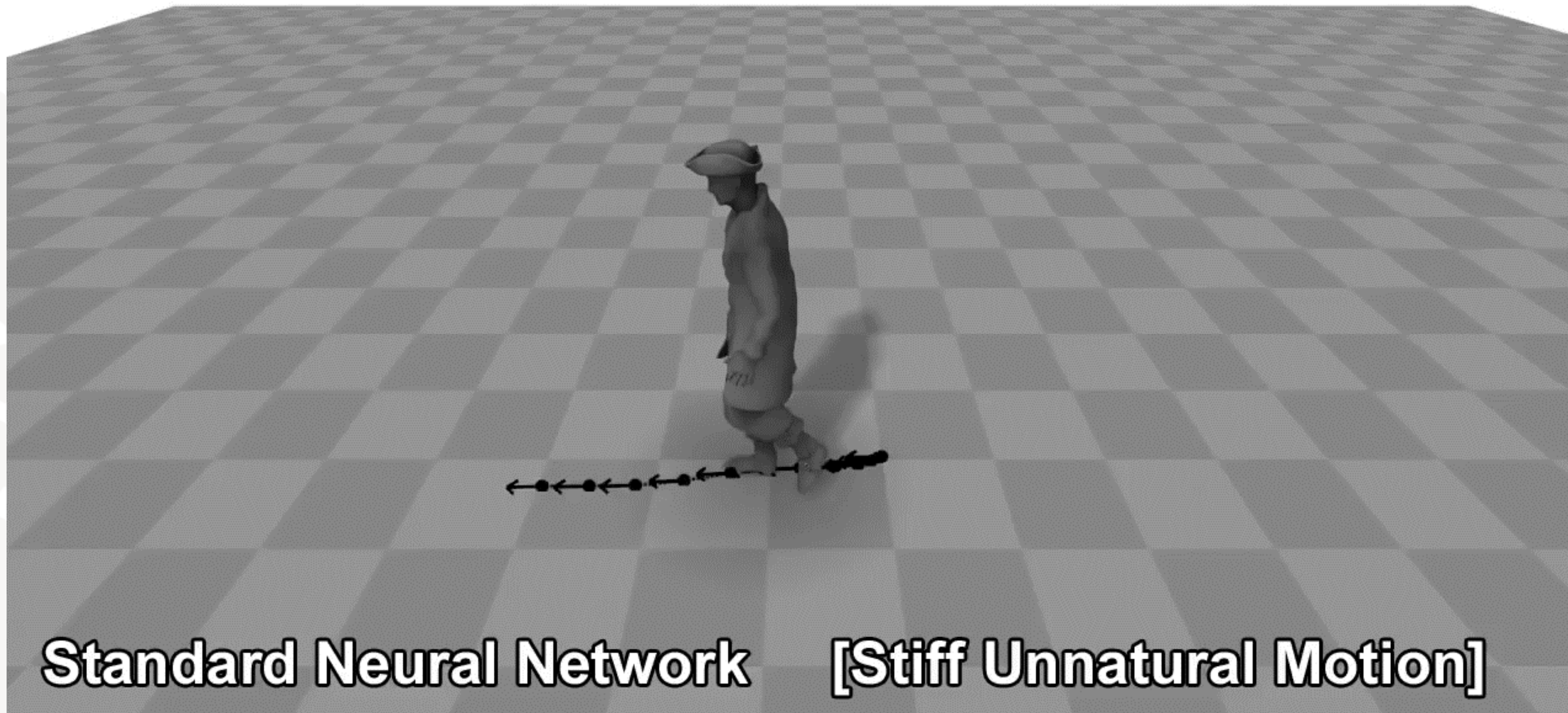
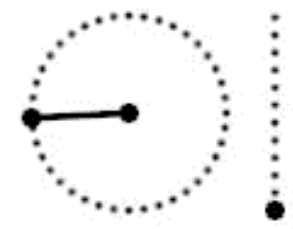
NPCs - Unreal Engine 4 – Behavior trees (also used in Halo)



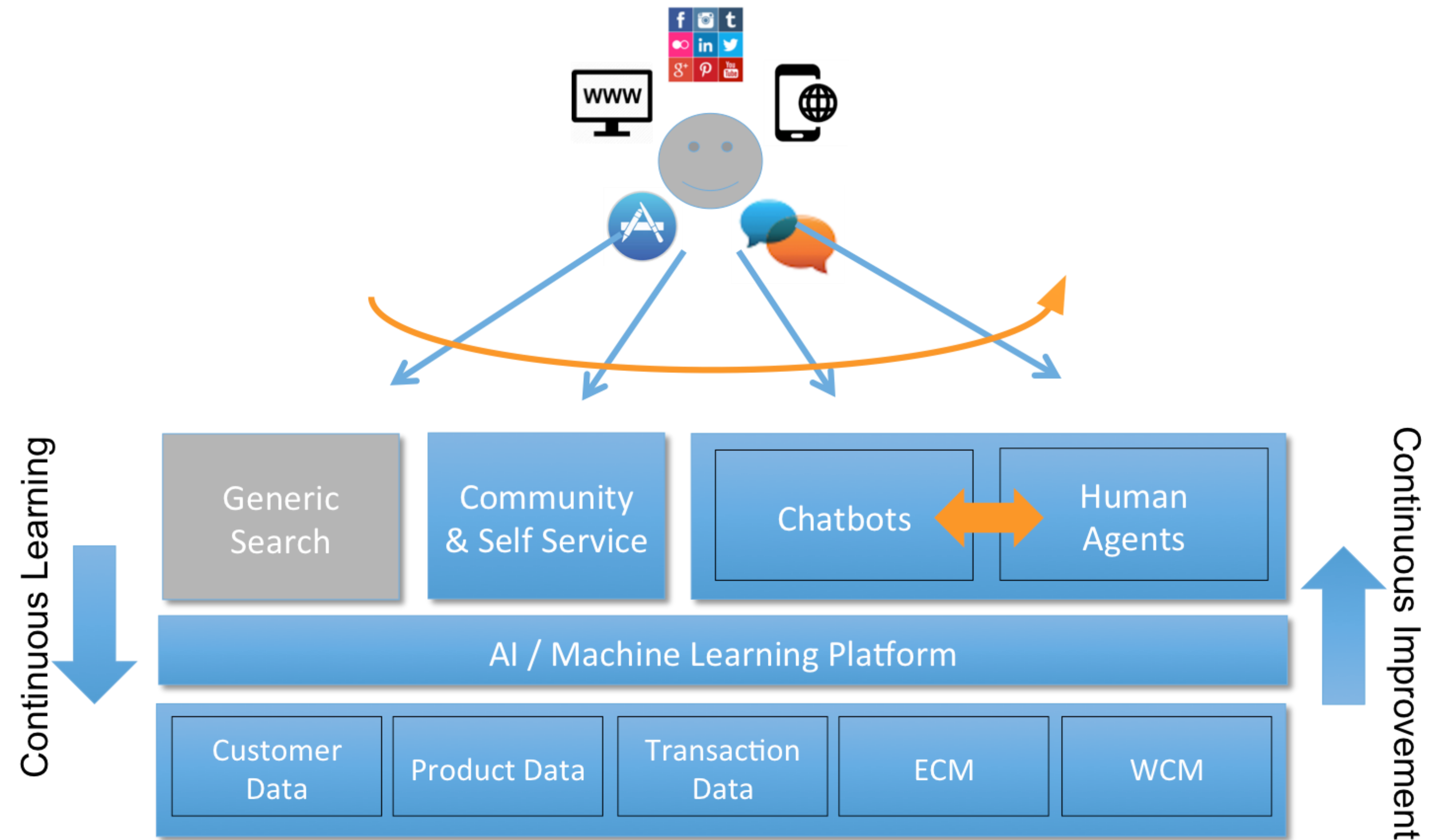
<https://answers.unrealengine.com>

<https://www.youtube.com/watch?v=36cKiPPrGHo>

Simulation of realistic motions

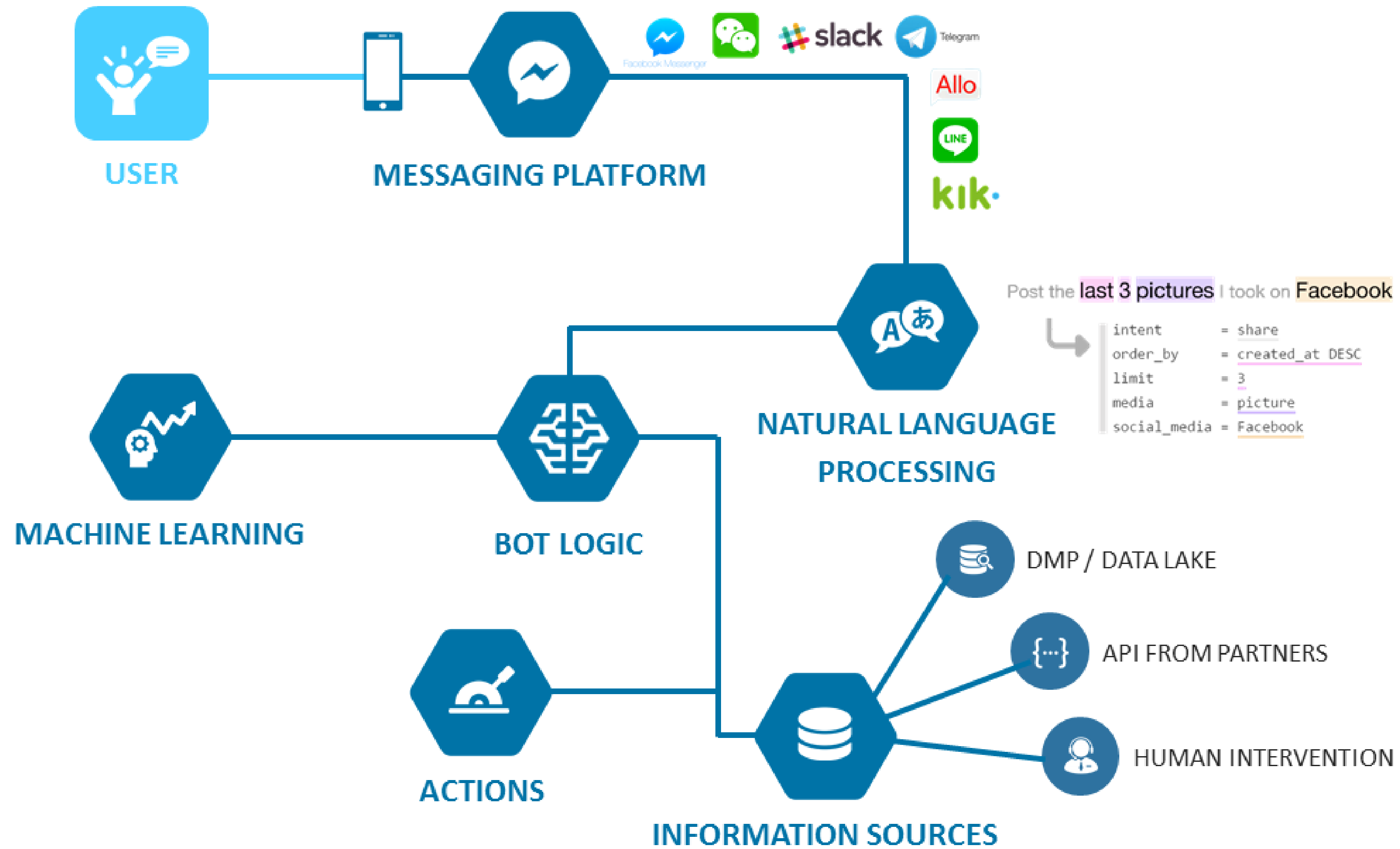


Customer Service Infrastructure



<http://www.epikonic.com/wp-content/uploads/Customer-Service-Infrastructure.png>

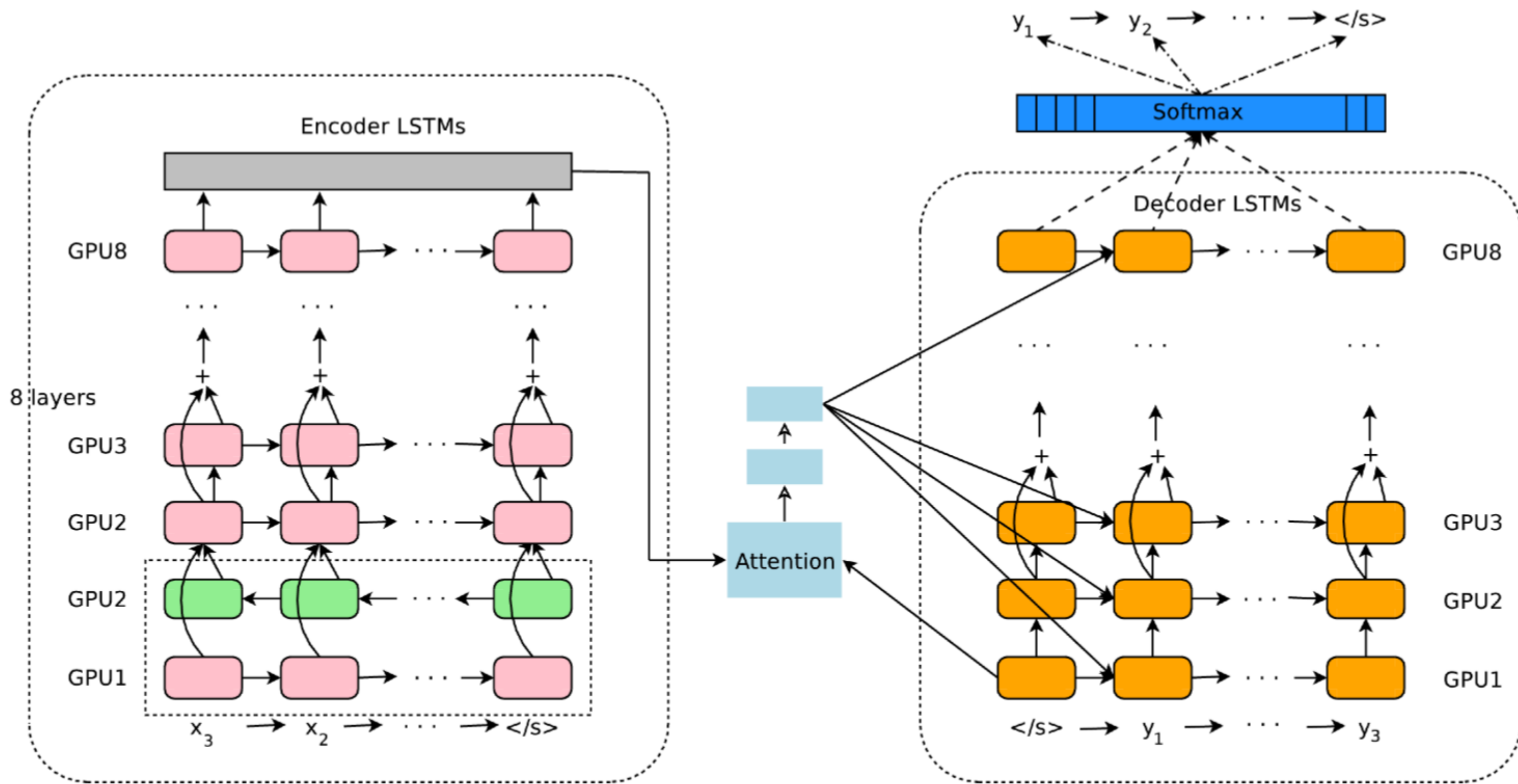
Chatbots



<https://chatbotsmagazine.com/the-ultimate-guide-to-designing-a-chatbot-tech-stack-333eceb431da>

Machine translation

Neural machine translation currently employed by google



[Google's Neural Machine Translation System: Bridging the Gap between Human and Machine Translation]

Smart cars – autonomous driving

LIDAR UNIT

Constantly spinning, it uses laser beams to generate a 360-degree image of the car's surroundings.

RADAR SENSORS

Measure the distance from the car to obstacles.

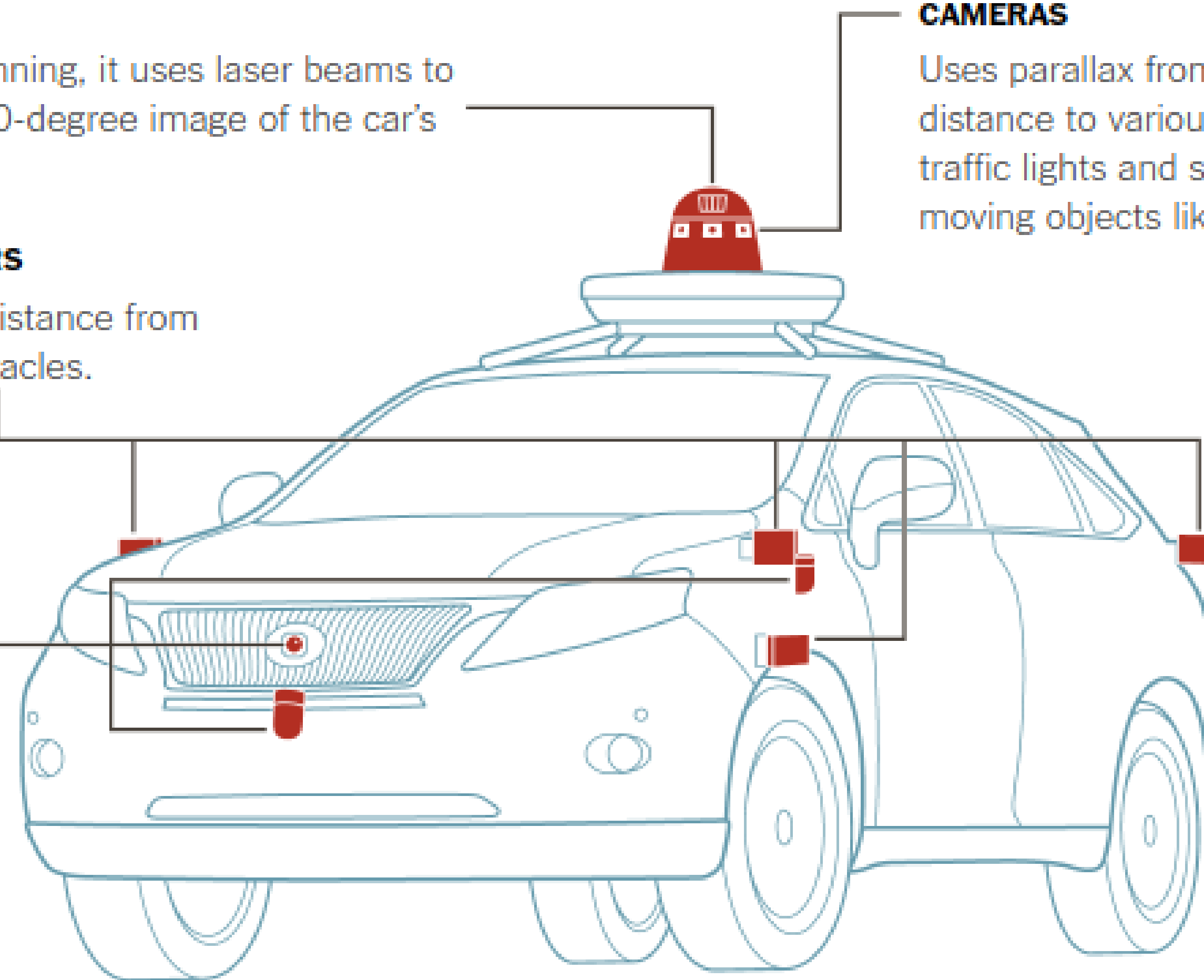
ADDITIONAL LIDAR UNITS

CAMERAS

Uses parallax from multiple images to find the distance to various objects. Cameras also detect traffic lights and signs, and help recognize moving objects like pedestrians and bicyclists.

MAIN COMPUTER (LOCATED IN TRUNK)

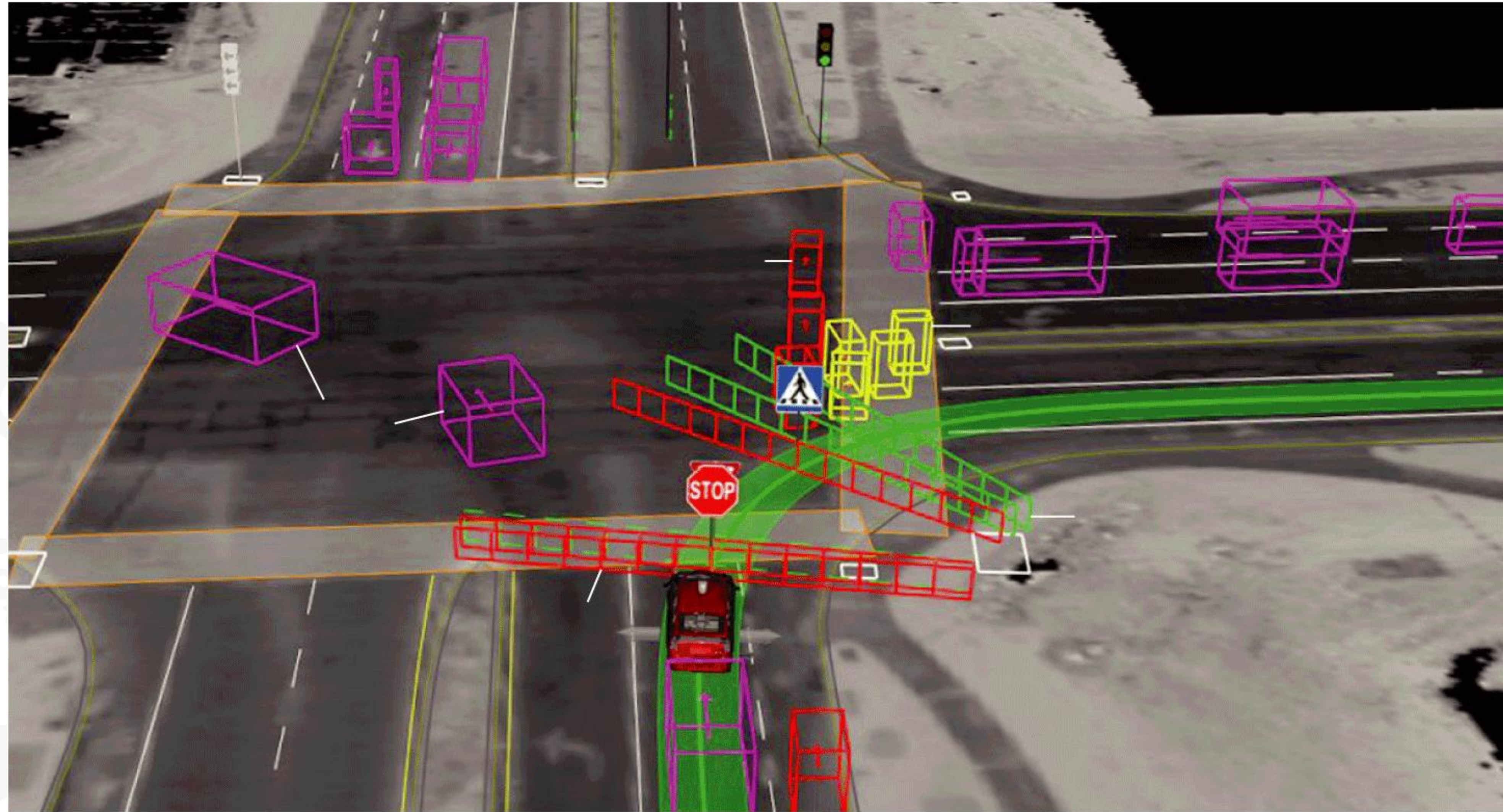
Analyzes data from the sensors, and compares its stored maps to assess current conditions.



By Guilbert Gates | Source: Google | Note: Car is a Lexus model modified by Google.

https://www.nytimes.com/interactive/2016/12/14/technology/how-self-driving-cars-work.html?_r=0

Smart cars – autonomous driving



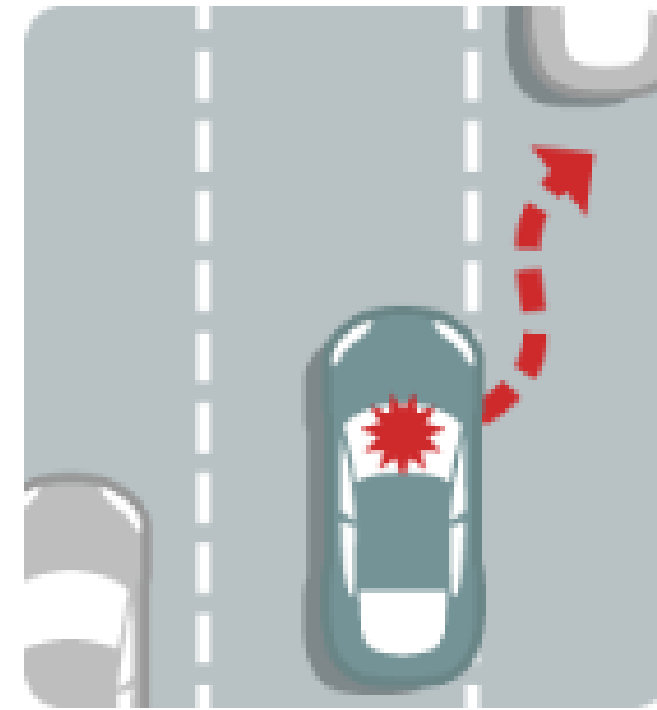
https://www.nytimes.com/interactive/2016/12/14/technology/how-self-driving-cars-work.html?_r=0

Smart cars – autonomous driving



Collision avoidance

Radar-, laser-, or camera-based systems warn of an impending collision, and can automatically apply the brakes in some cases.



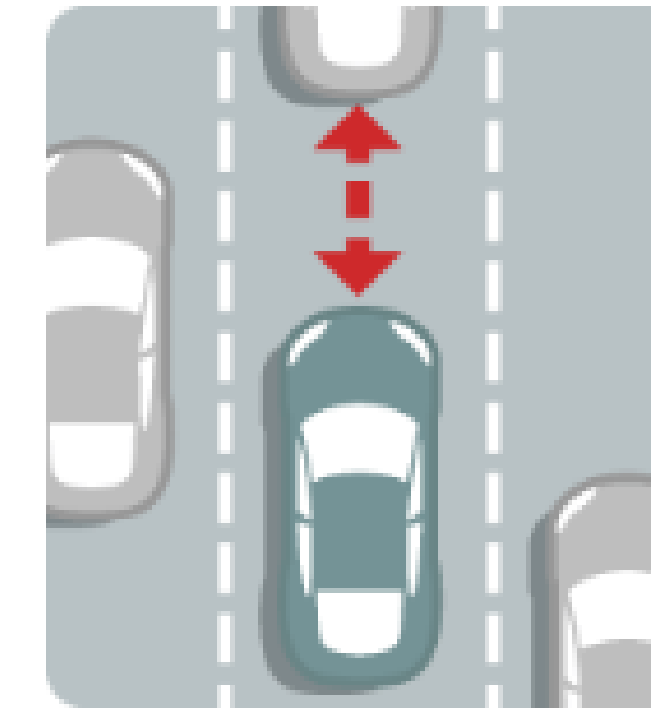
Drifting warning

If a car begins to deviate from its lane, some systems alert the driver and apply a small counter-steering force.



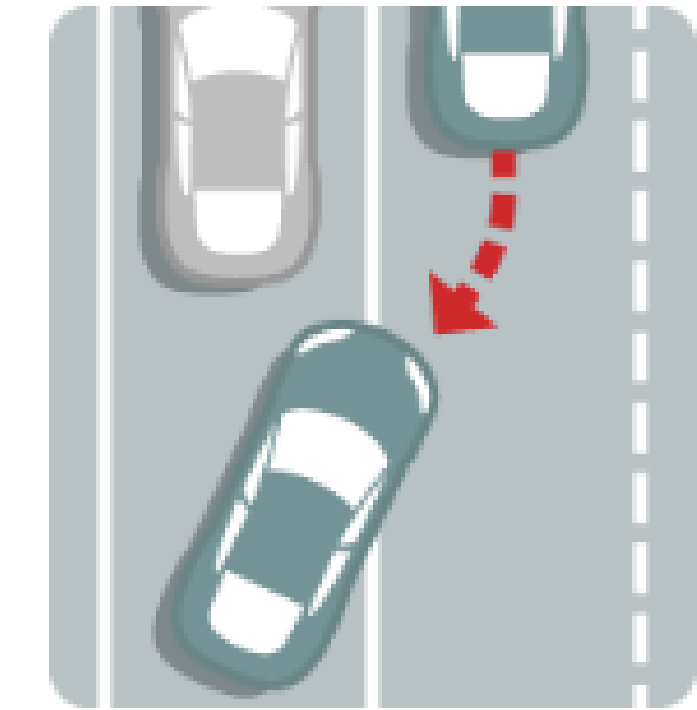
Blind-spot detectors

Cameras or radar can detect vehicles in the driver's blind spot and then alert the driver with sounds or warning lights.



Enhanced cruise control

A predefined distance can be maintained to the vehicle ahead. If it slows, your car also slows.

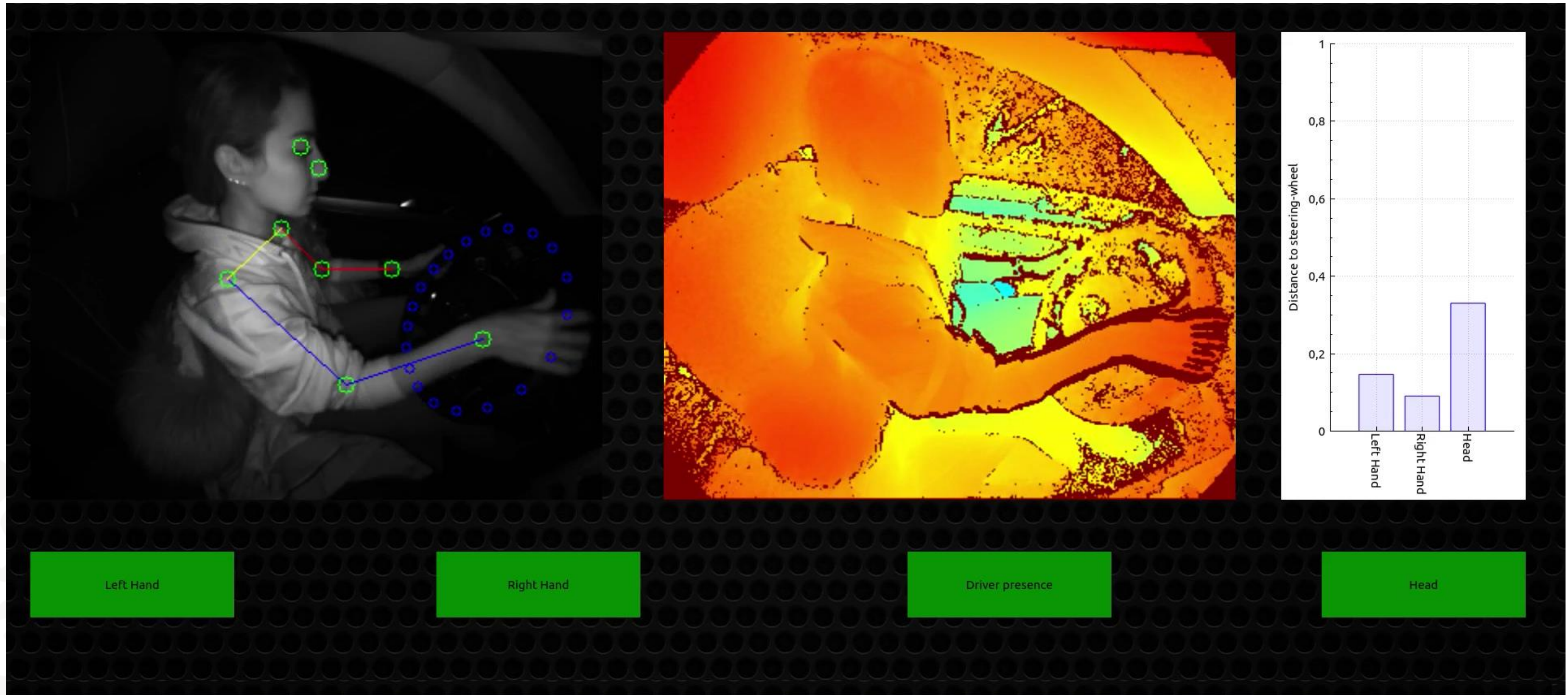


Self parking

The car maneuvers itself into a parking spot using cameras or sonar. But the driver usually has to brake and follow commands.

https://www.nytimes.com/interactive/2016/12/14/technology/how-self-driving-cars-work.html?_r=0

Smart cars – Driver/passenger monitoring

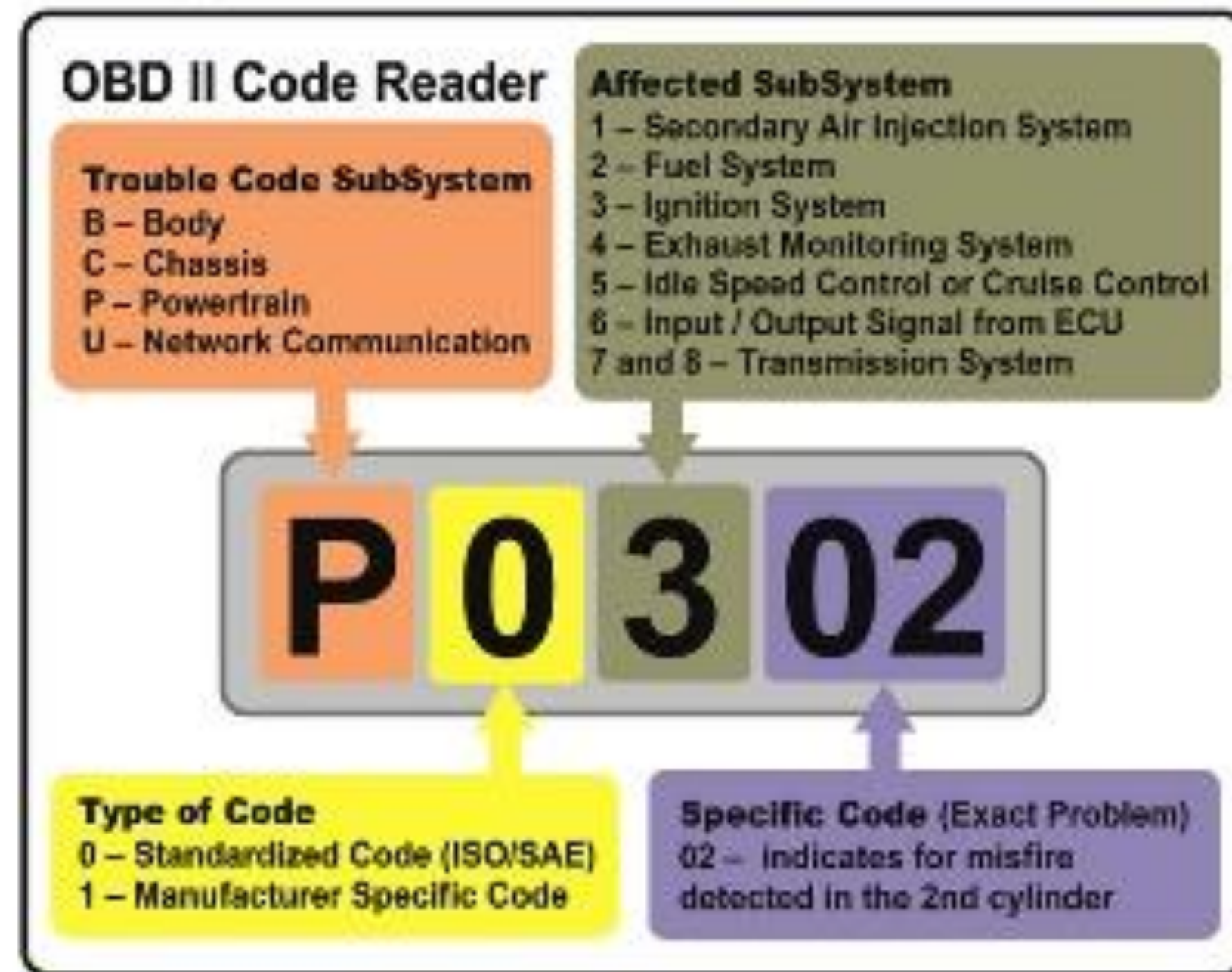


Smart cars – Predictive maintenance

On-Board Diagnostics



Diagnostic Trouble Codes (DTC)



Unscheduled repairs



AB1029 - Power steering pump replacement
 CT3408 - Wheel alignment

Pivotal

Data Sources for Predictive Maintenance

Vehicle Sensor Data



- VIN
- Timestamp
- DTC Code
- Odometer
- Speed
- Acceleration
- Engine Temperature
- Engine Torque
- GPS Coordinates
- etc.

Vehicle Repairs Data



- VIN
- Date vehicle in
- Date vehicle out
- Repair code
- Parts replaced
- Warranty claims
- Repair Comments

Pivotal



1. Detection
Real-time categorization and search of external appearance and movement features

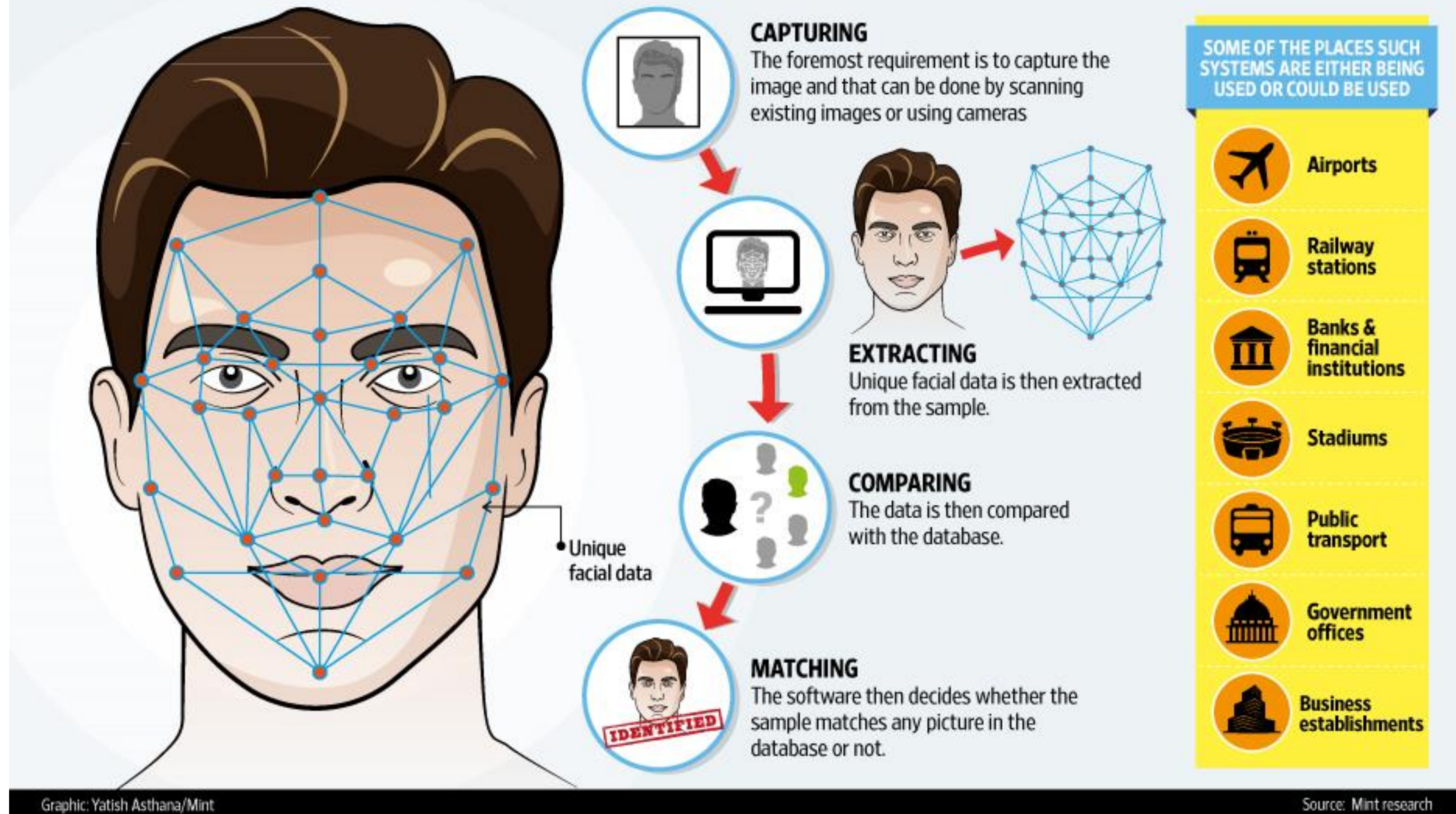


2. Tracking
Analysis of the entire body image, and extract images of the same person



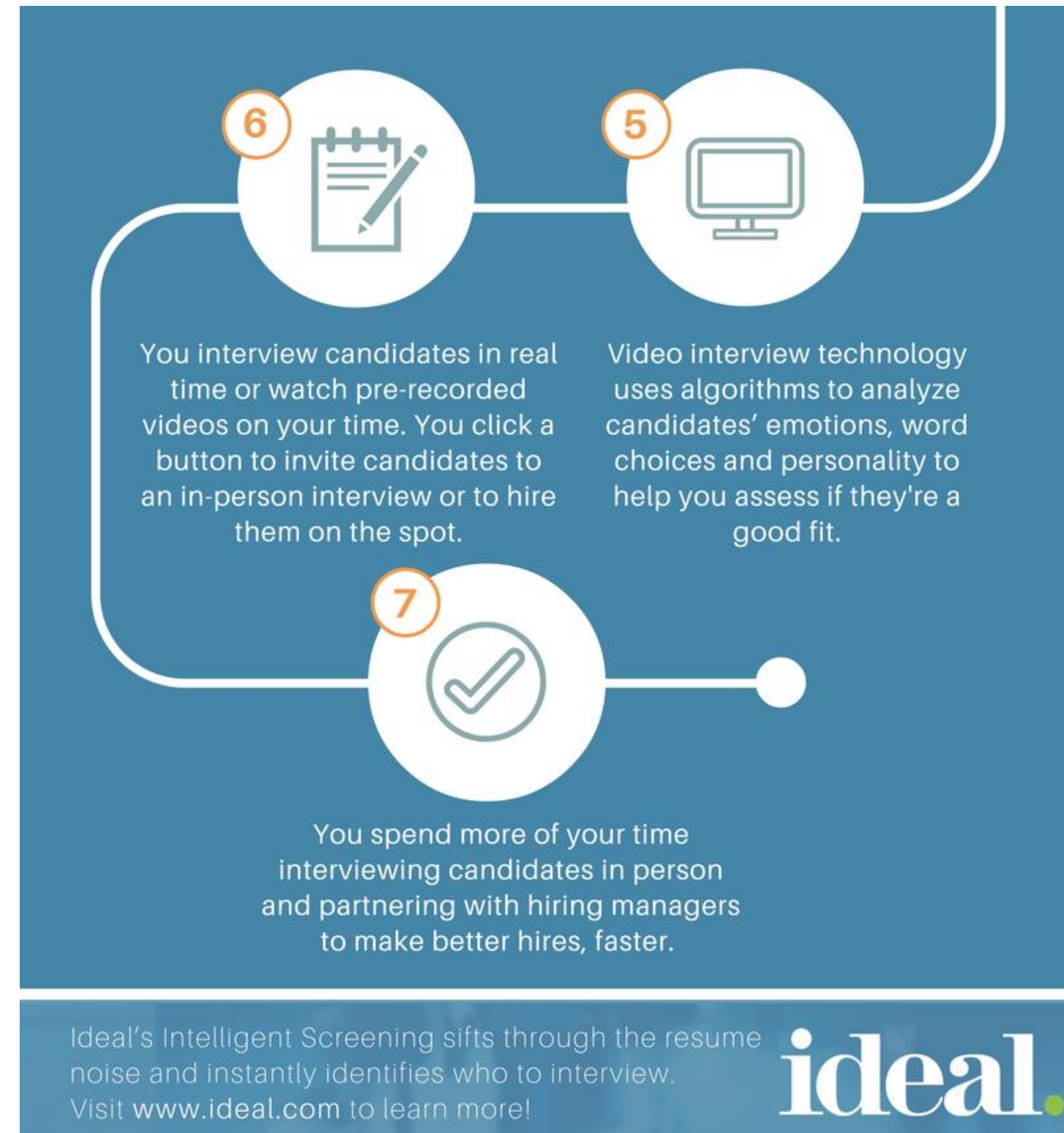
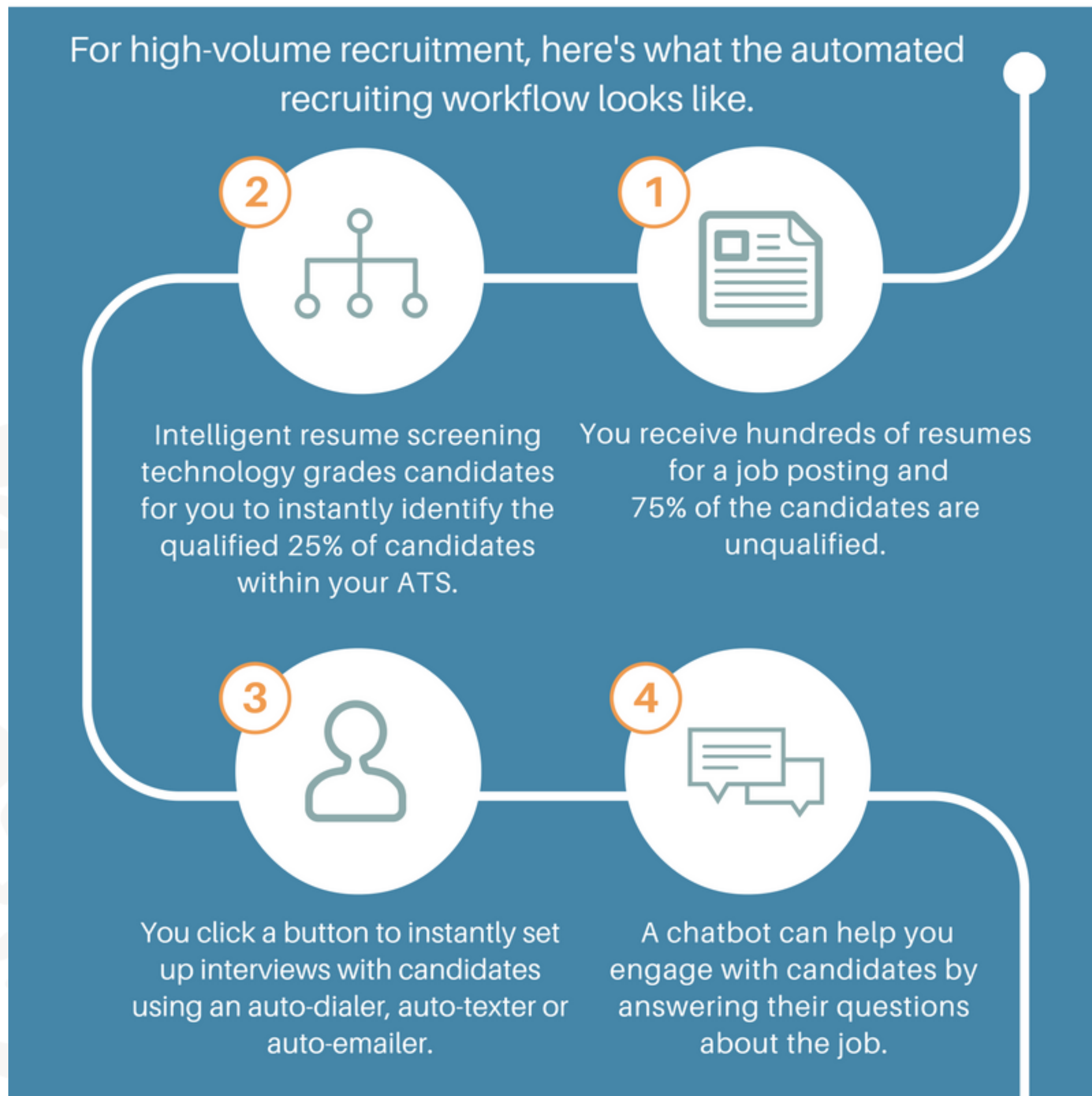
STEP BY STEP

Currently used by governments and private firms across the world, facial recognition is considered the least intrusive of biometric technologies



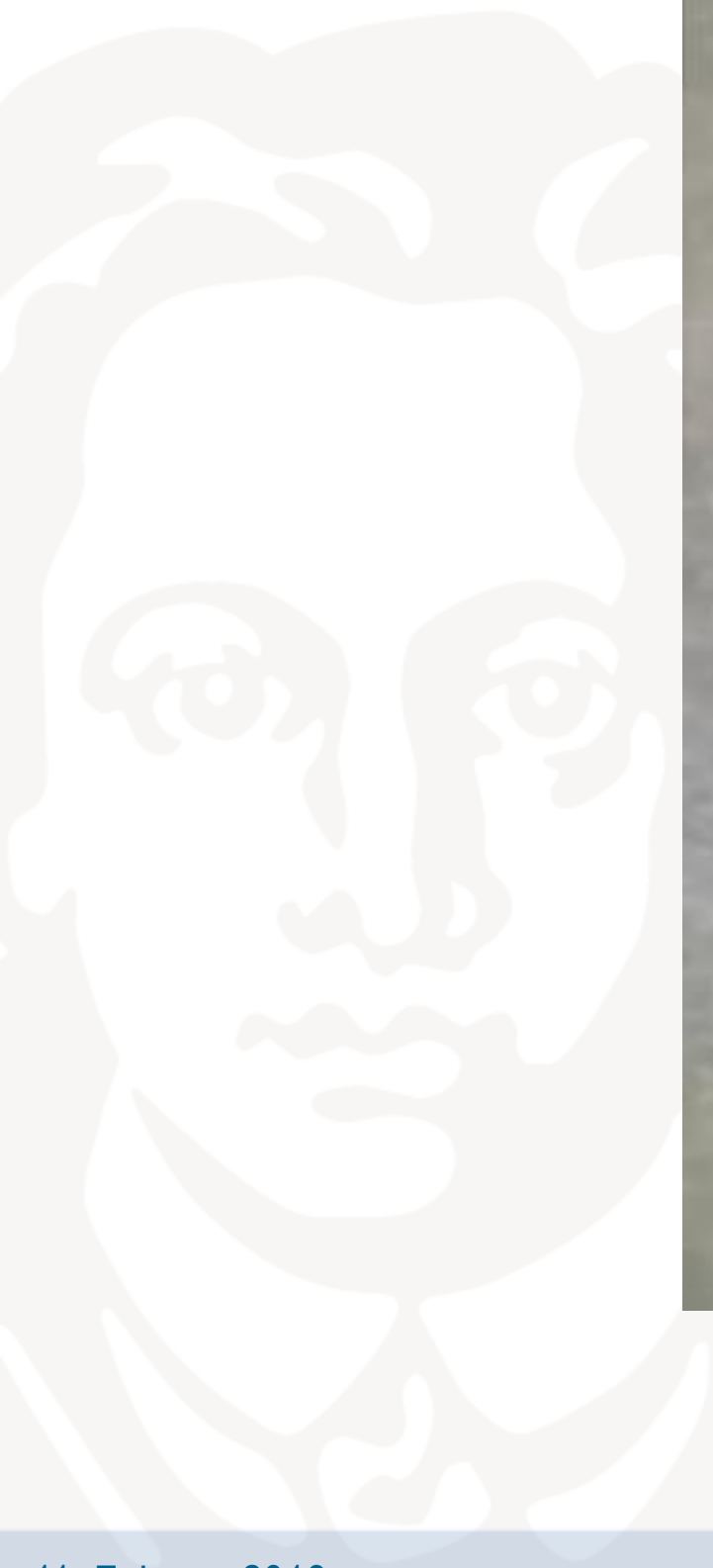
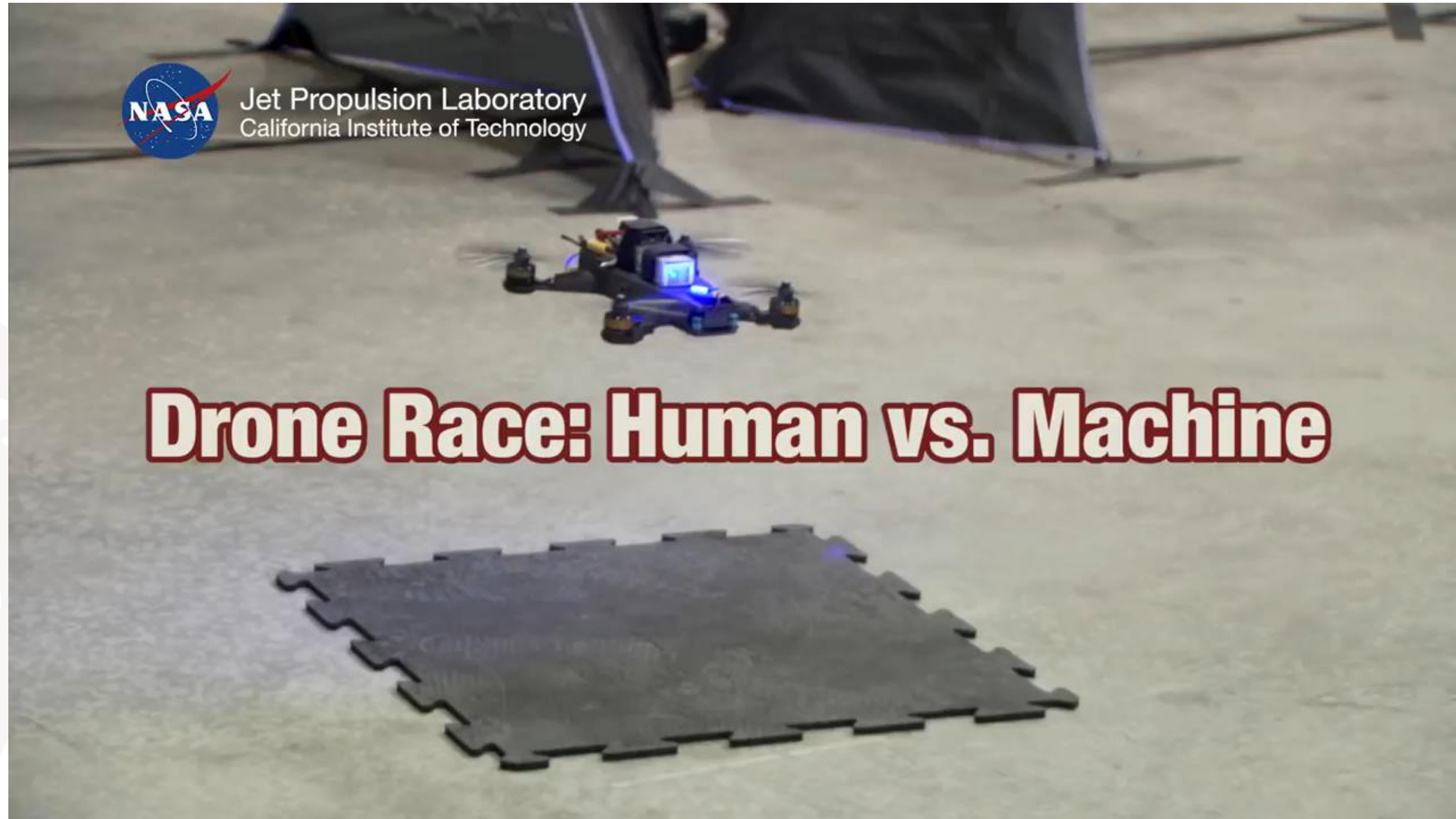
<https://www.computerworld.com/article/3225874/mobile-wireless/apples-clever-strategy-for-forcing-partners-to-use-face-id.html>

<http://www.livemint.com/Consumer/pFBcdMfLmXKXOiphe2RbFL/How-facial-recognition-works.html>





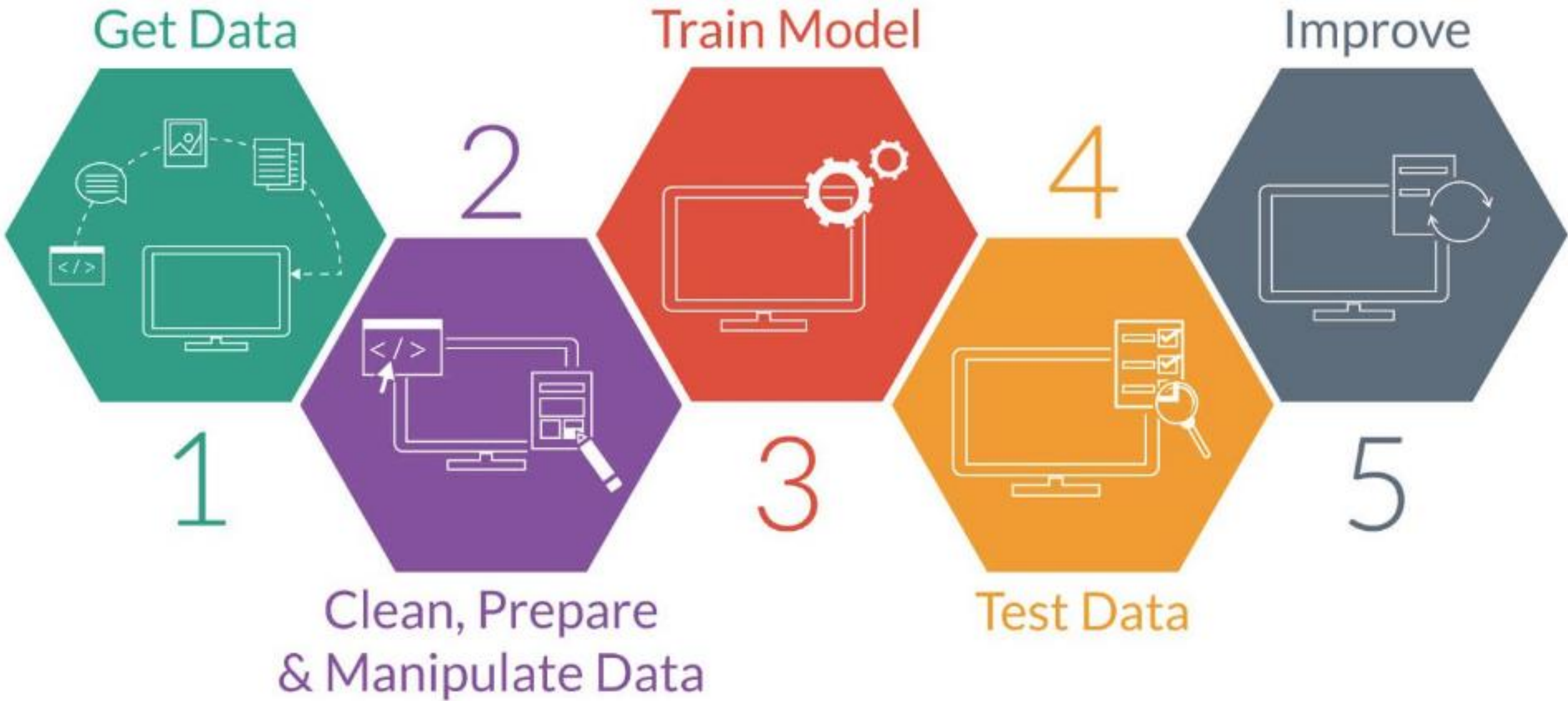
Autonomous Driving: von
Mechanik & Technik
Prof. Dr. Gerd Schmitt, Dr. rer. oec. P. How



Summary & Outlook

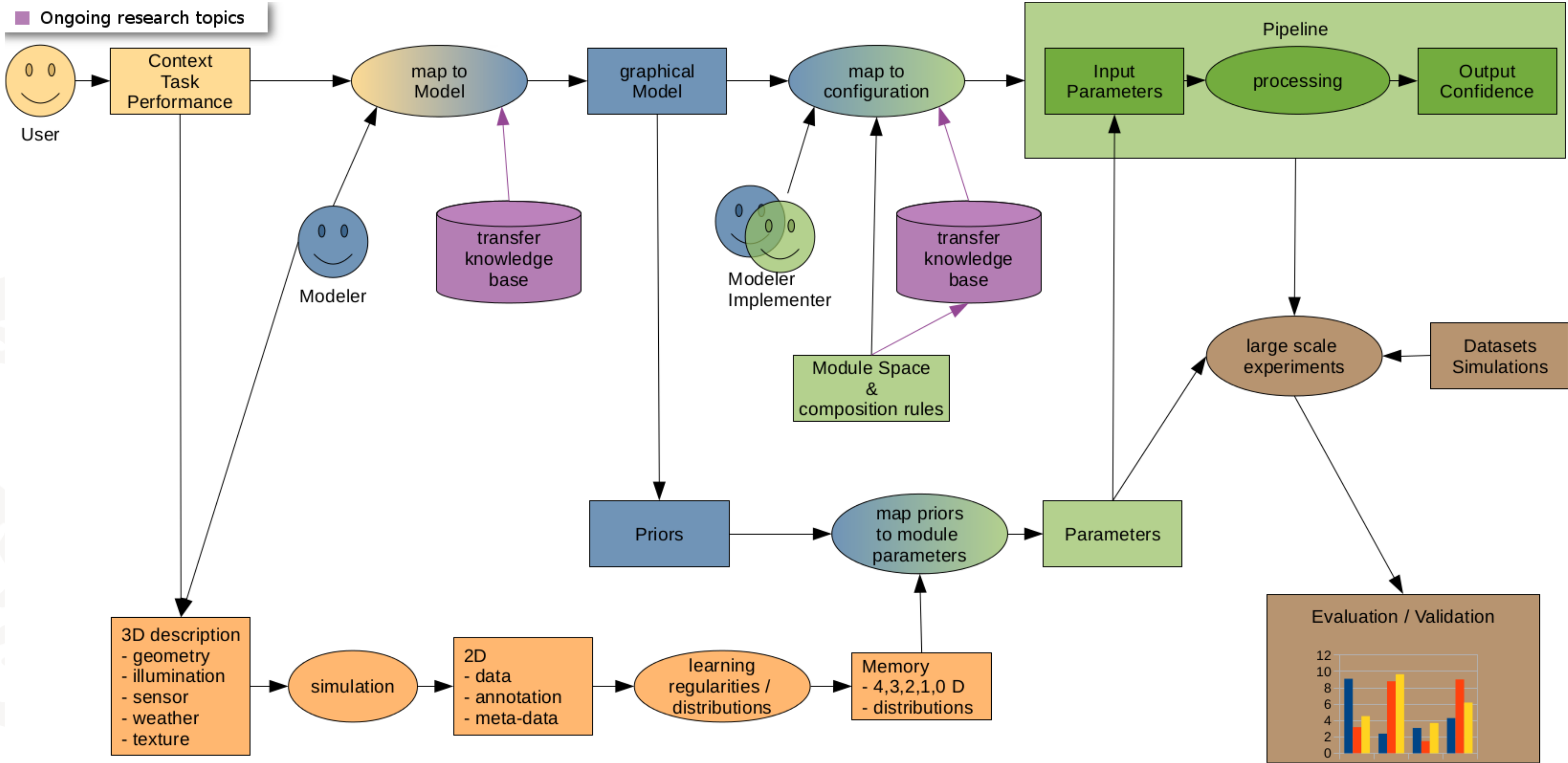


Current approaches to create models



<https://medium.freecodecamp.org/every-single-machine-learning-course-on-the-internet-ranked-by-your-reviews-3c4a7b8026co>

Curent approaches to create models



Trends – future developments

- Context-sensitivity
- Multi-source-fusion
- Multi-model-fusion
- Deployment in critical systems -> explainability
- Models closer to general-purpose algorithms -> reasoning and abstraction
- Systematic re-use of previously learned features and architectures -> meta-learning

