2023'e Doğru TÜBİTAK ile Geleceğe Bakış

Türkiye Cumhuriyeti
SANAYİ VE TEKNOLOJİ BAKANLIĞI

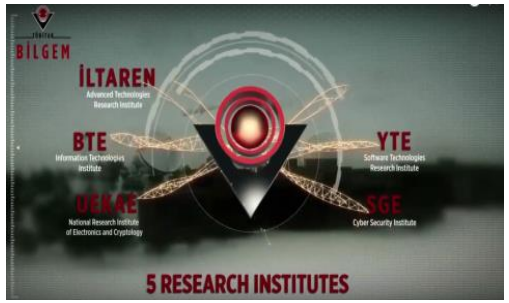
TÜBİTAK

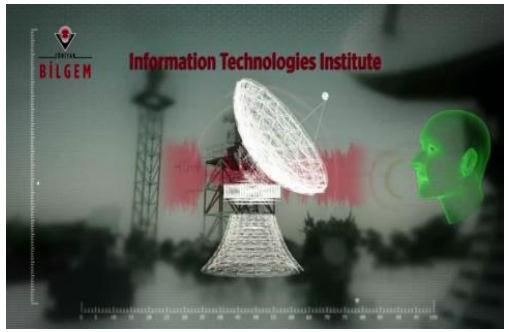
Artificial Intelligence Research Activities of TÜBİTAK BILGEM

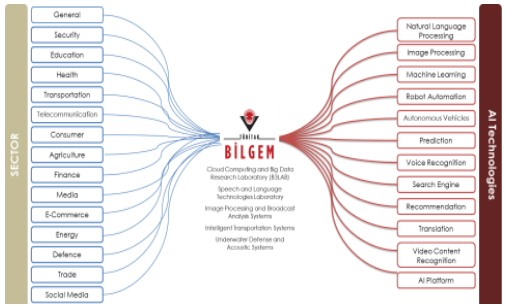
Within the R&D and Innovation Ecosystem

January 29-30, 2020

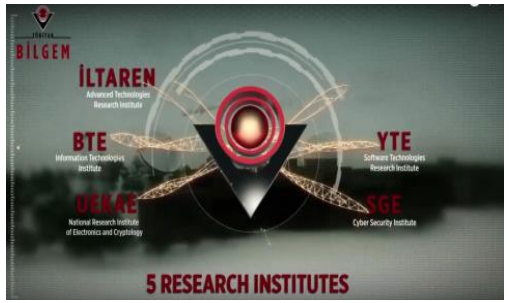
From Artificial Intelligence Capabilities to Collaboration Opportunities

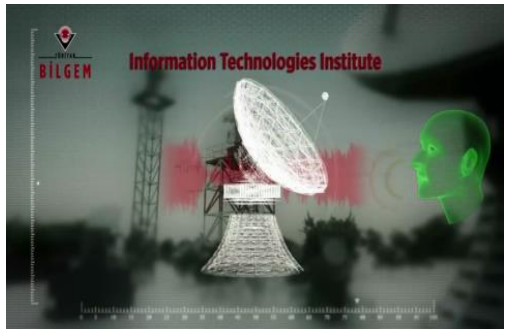


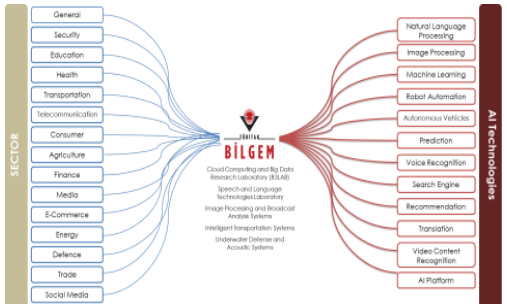




- TÜBİTAK BİLGEM Artificial Intelligence Capabilities
- TÜBİTAK BİLGEM Artificial Intelligence Projects
- Role of TÜBİTAK BİLGEM in the Ecosystem
- Collaboration Opportunities







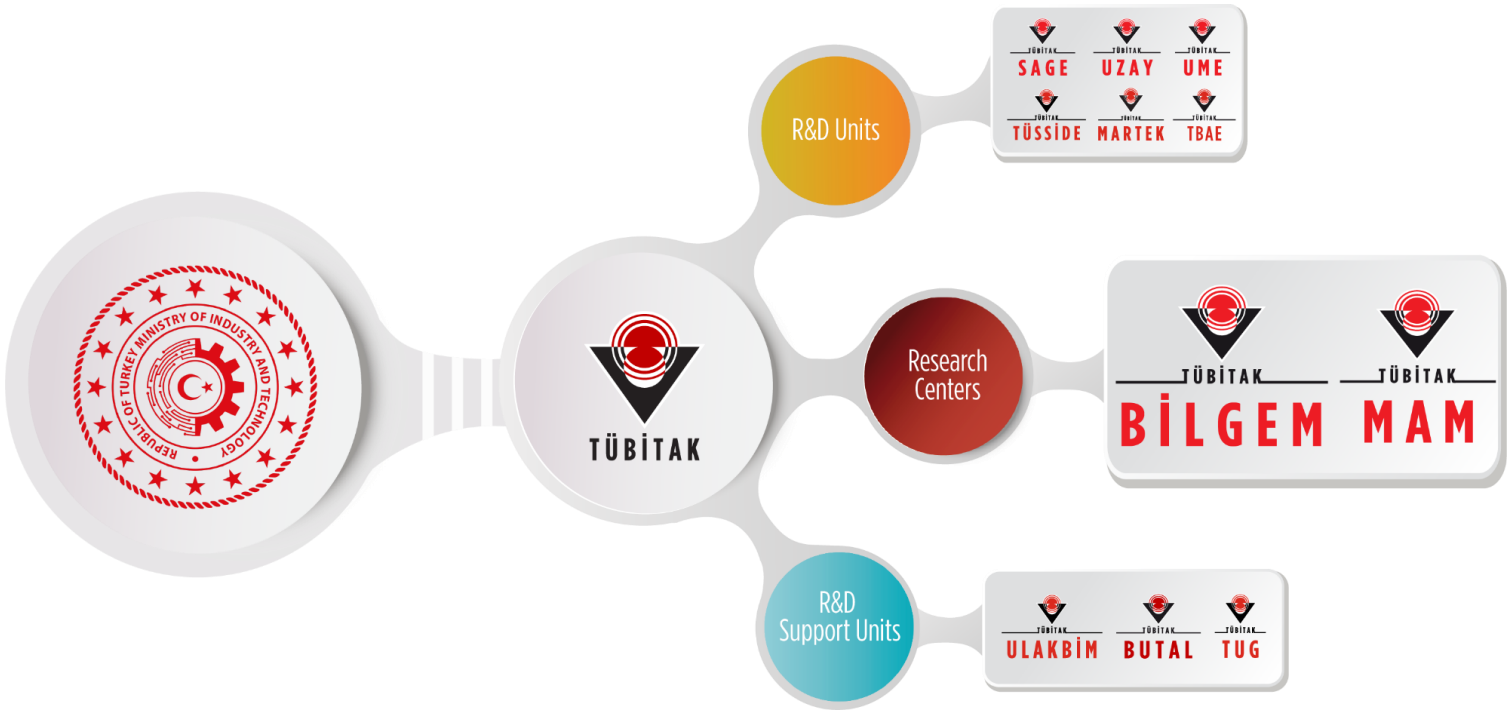
TÜBİTAK BİLGEM Artificial Intelligence Capabilities

TÜBİTAK BİLGEM Artificial Intelligence Projects

Role of TÜBİTAK BİLGEM in the Ecosystem

Collaboration Opportunities

History of TÜBİTAK and BİLGEM

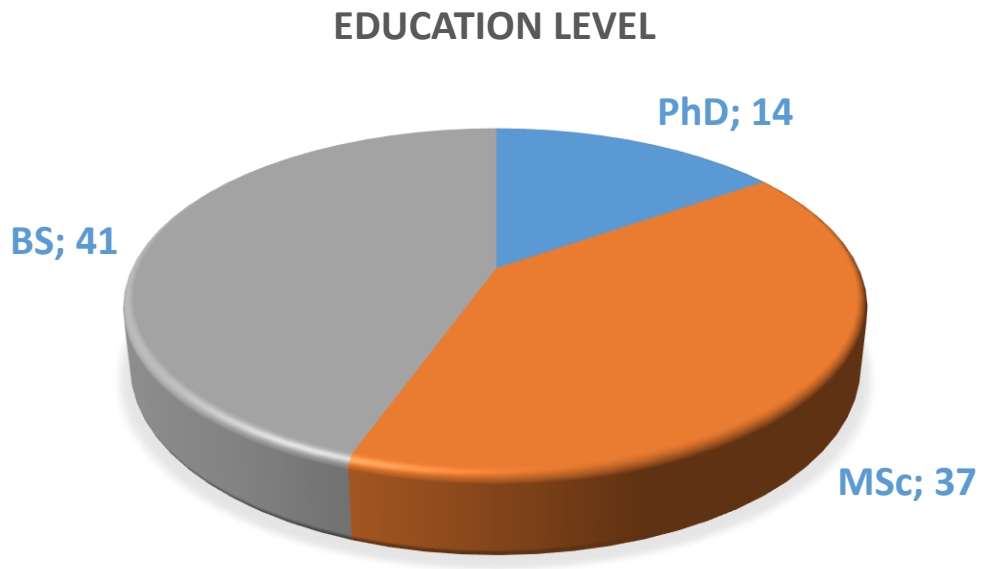


TÜBİTAK BİLGEM Artificial Intelligence Capabilities

TÜBİTAK BİLGEM AI Research Departments

- Cloud Computing and Big Data Lab (B3LAB)
- Speech and Language Technologies Lab
- Image Exploitation and Broadcasting Systems
- Border and Homeland Security Support Systems
- Intelligent Transport Systems
- Communication and Signal Processing Lab - HISAR

Total Researchers		**92**
Researchers' Education Level	PhD	14
	MSc	37
	BS	41
Graduate Students	PhD	18
	MSc	24



TÜBİTAK BİLGEM Artificial Intelligence Hardware Infrastructure

B3LAB Prototype Data Center

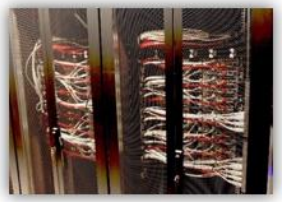
- Area: **40m²**
- Capacity: **400** Servers / **20k** CPU
- **1 PB** Total Storage Area
- Total **1.6 TBps** network switching capacity with **100 GB** network switches
- TIER 2+

Exterior


Interior


Servers


Cooling System


Cabling

Voice and Speech Technology Assessment

Semi-anechoic acoustic recording and test rooms which are approved by ISO and NATO and certified by RW-TÜV serve as Turkey's first "Voice and Speech Technology Assessment" infrastructure.

TÜBİTAK BİLGEM Artificial Intelligence Software Infrastructure

B3LAB Cloud Infrastructure

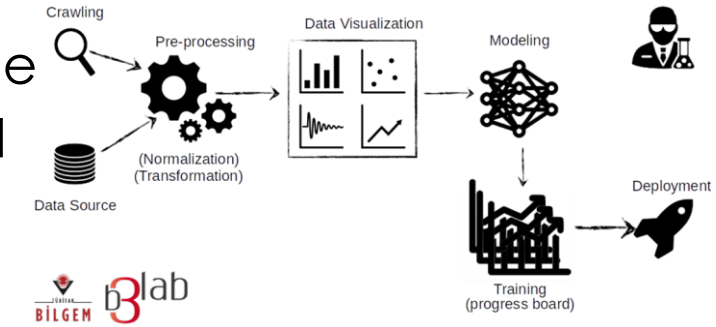
- OpenStack based Cloud Computing Infrastructure
- 2500-Core Processor Capacity
- 15 TB RAM
- Cloud Monitoring Tool
- Auto Snapshot
- Auto Scaler
- Green Cloud Computing Scheduler

B3LAB Safir Big Data

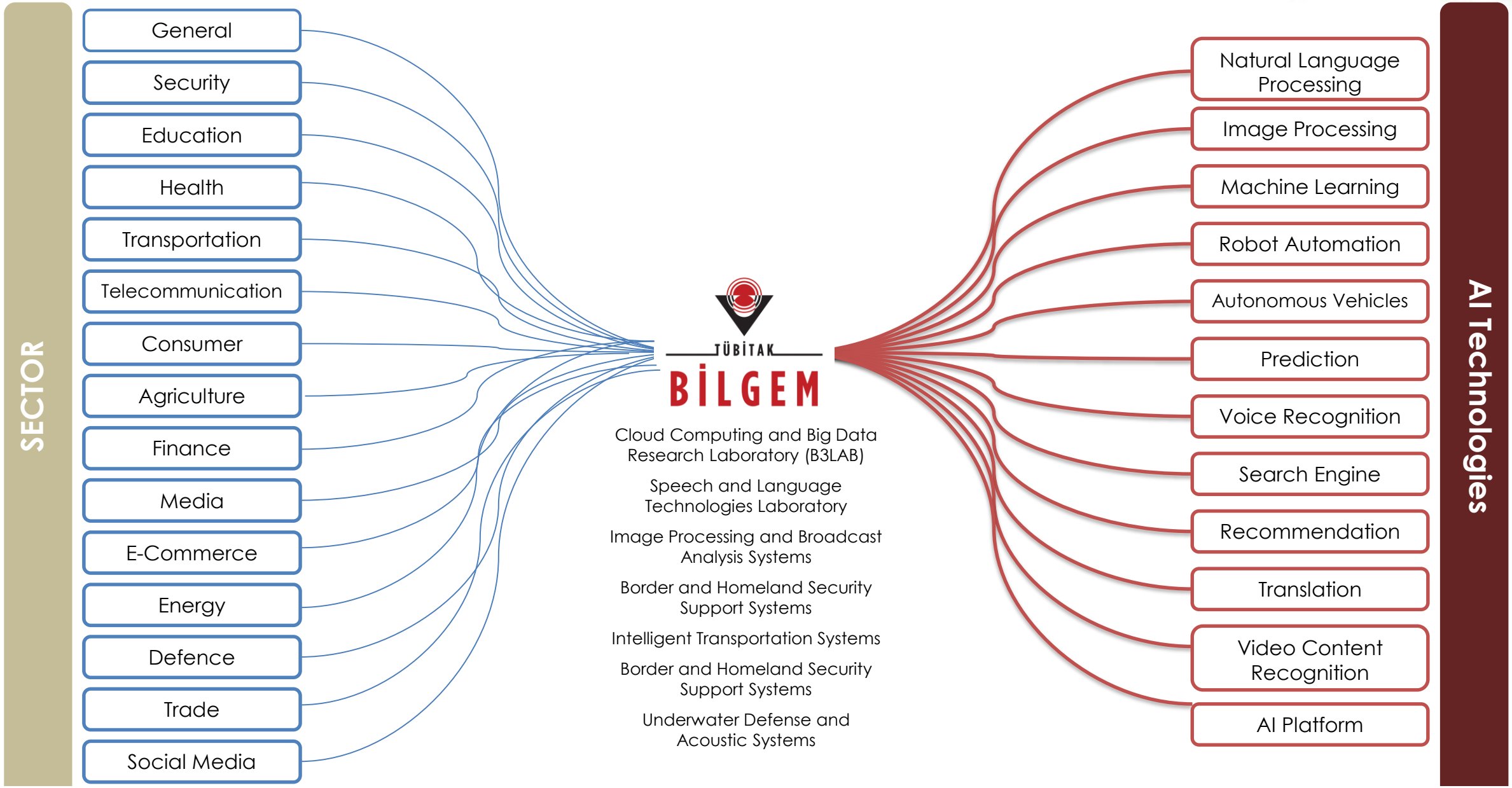
- Open source Big Data Ecosystem
- Big Data Architecture Solutions
- Data Flow and Processing Solutions
- Analytics Solutions
  - Anomaly Detection
  - Prediction
  - Classification
  - Clustering

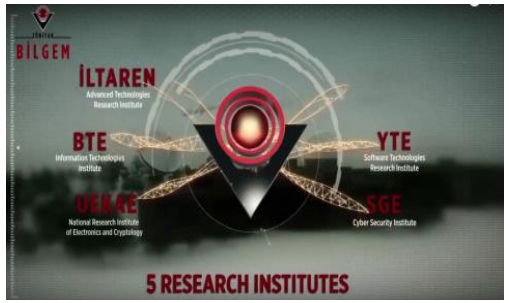
B3LAB Safir Intelligence

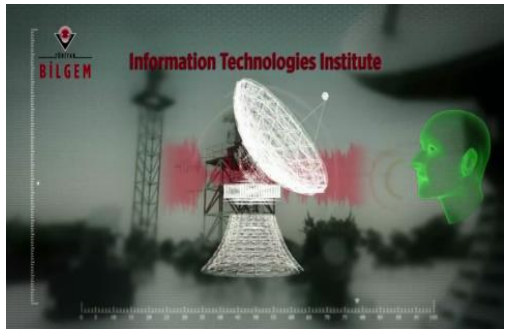
- National and open source Machine Learning as a Service (*MLaaS*) and Artificial Intelligence as a Service (*AIaaS*).

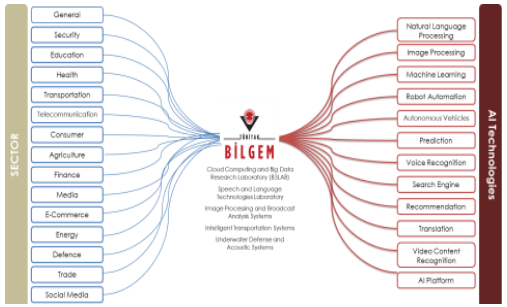


TÜBİTAK BİLGEM Artificial Intelligence Capabilities









TÜBİTAK BİLGEM Artificial Intelligence Capabilities

TÜBİTAK BİLGEM Artificial Intelligence Projects

Role of TÜBİTAK BİLGEM in the Ecosystem

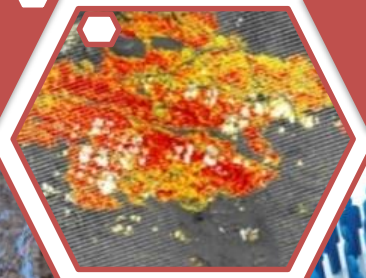
Collaboration Opportunities

TÜBİTAK BİLGEM Artificial Intelligence Projects

Speech Recognition

Digital Recording, Archiving and Analysis System

Land Cover Use Classification and Monitoring System



Artificial Intelligence for Border Services

Speech-to-Speech Translation

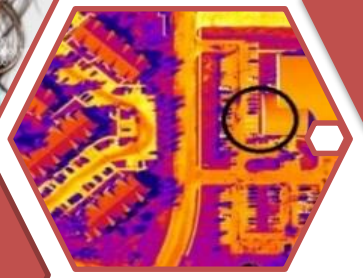
NLP

IoT Predictive Maintenance for White Goods

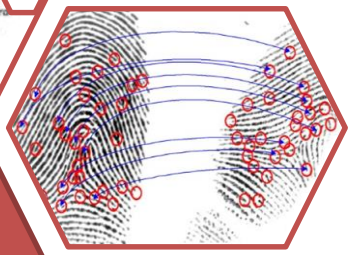
Deep Learning based inflation forecasting

Face Recognition Systems

Smart Electronic Storage And Image Processing Solutions



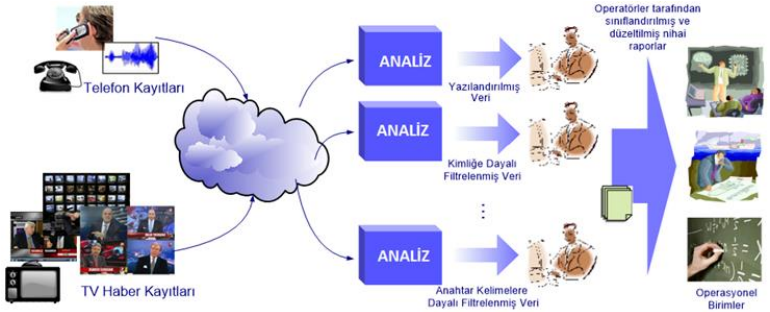
Safir Intelligence

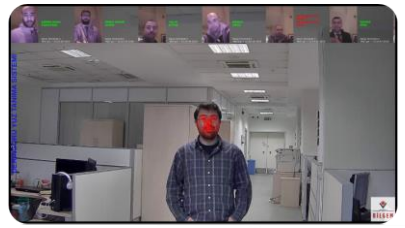


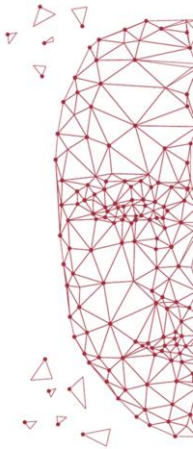
Explainable AI

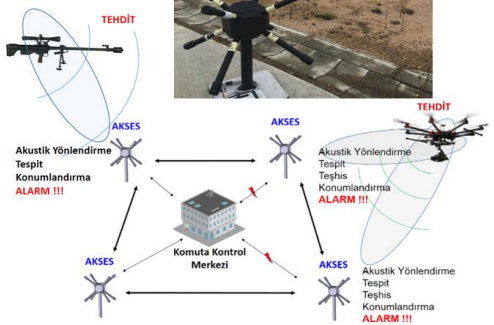
5G Mobix

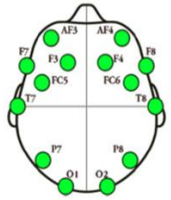
TÜBİTAK BİLGEM Artificial Intelligence Projects

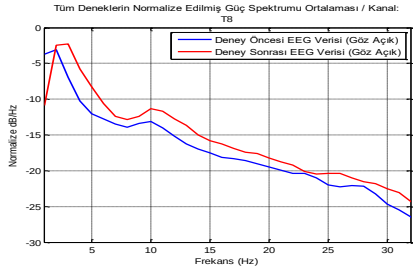


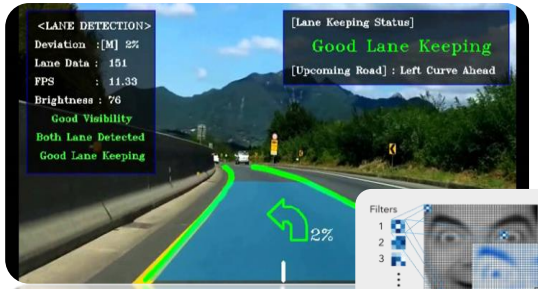


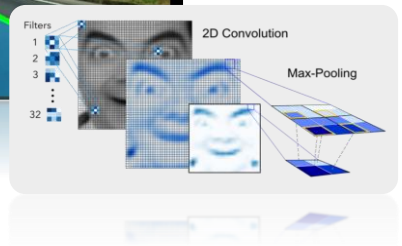












RTÜK
RADYO ve TELEVİZYON ÜST KURULU

TÜBİTAK BİLGEM

Project of Data Governance Tool Development for Turkish Customs

Purpose: To strengthen the customs surveillance and control function of the Ministry of Trade (MoT) all across Turkish Customs Territory by increasing its administrative, technical and operational capacity and by strengthening the structure of Customs Enforcement Coordination Center (CECC) utilizing a data governance tool development based on **big data technologies** and **machine learning algorithms**.

EU IPA Call: Technical Assistance for Improving the Detection Capacity of Turkish Customs Enforcement (EuropeAid/139188/IH/SER/TR)

Contracting Authority: Central Finance and Contracts Unit (CFCU)

Beneficiary: Ministry of Trade, General Directorate of Customs Enforcement

T.C. TİCARET BAKANLIĞI

Turkish Statistical Institute Big Data and Advanced Analytics Project

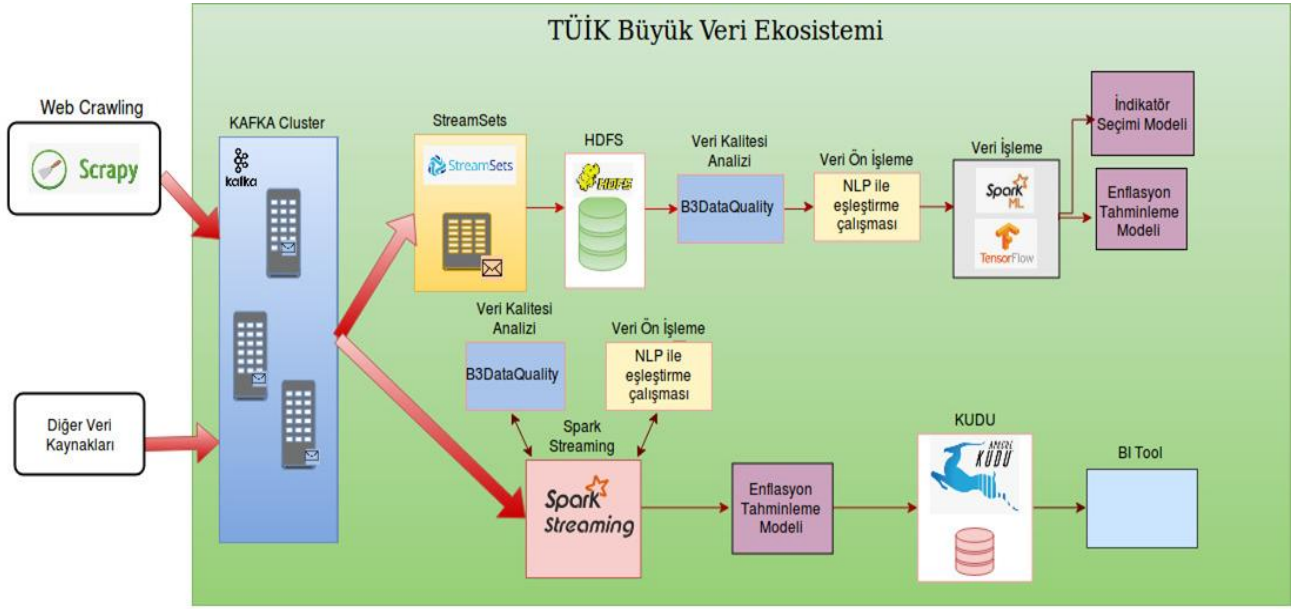
Purpose: The estimation of inflation indices such as the WPI [Wholesale Price Index] and CPI [Consumer Price Index] as well as the determination of indicators in determining these indices in the big data ecosystem as batch and streaming data labeled with category and sub-category information provided by web crawling and other sources from different stores. Taking advantage of machine learning and deep learning within the scope of this study, we will both forecast inflation and determine the most accurate indicator products that should be selected in the basket for the best inflation forecast using AI techniques.

Contracting Authority:

Turkish Statistical Institute

Beneficiary:

Ministry of Treasury and Finance of Turkey

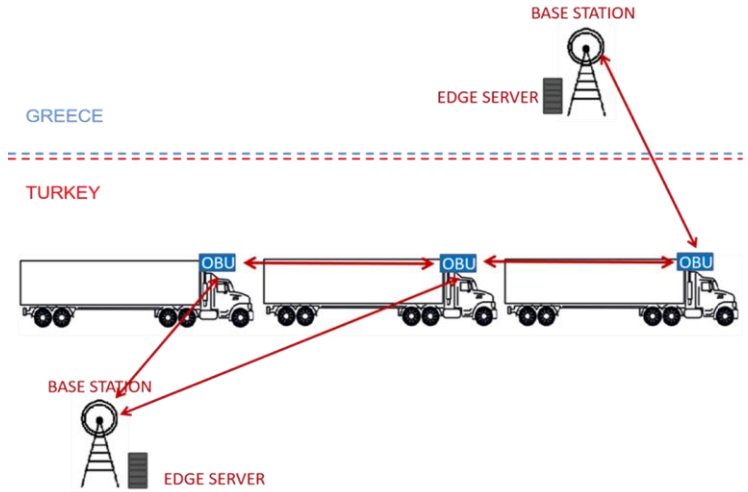


H2020 - 5G MOBIX

ICT-18-2018: 5G for cooperative & connected automated MOBIility on X-border corridors

Start Date: 01 Nov 2018
End Date: 31 Oct 2021

5G-MOBIX will develop and test automated vehicle functionalities using 5G core technological innovations along multiple cross-border corridors and urban trial sites, under conditions of vehicular traffic, network coverage, service demand, as well as considering the inherently distinct legal, business and social local aspects.



Role and relevance in the project: Involving in x-border trials between Greece & Turkey by implementing newly developed **AI based automation techniques** at vehicle security checks and **AI based path planning** for the autonomy of the platooning trucks.

Project partners:

FORD OTOSAN, TURKCELL TEKNOLOJİ, ERICSSON, COSMOTE, Fraunhofer IAO, Fraunhofer IIS

ADACORSA (RIA): Airborne Data Collection On Resilient System Architectures

Start Date: April 2020
End Date: March 2023

ADACORSA aims to strengthen the European drone industry and increase public and regulatory acceptance of BVLOS drones, by demonstrating technologies for safe, reliable and secure drone operation in all situations and flight phases.

Role and relevance in the project:

- Develop a central coordinator software to manage a high level view of cooperative vehicle tasks with modules:
  - **Task Planning and Scheduling with AI techniques**
  - **AI-based Path Planning**
- Develop the algorithms for the communication of Drone-Drone and Drone-Ground device which will be similar to V2X platforms

Project partners:

FORD OTOSAN, TURKCELL TEKNOLOJİ, TÜRKHAVACILIK UZAYSANAYİİ, Fraunhofer, Fraunhofer FHR

BEYOND 5 (IA): Building The Fully European Supply Chain On RFSOI, Enabling New RF Domains For Sensing, Communication, 5G And Beyond

Start Date: April 2020
End Date: March 2023

BEYOND5 is a technology project aiming to manufacture highly innovative components in Europe (three pilot lines in two European countries), to aggregate the value chain to demonstrate added value at the user level (six demonstrators) and to reinforce a design ecosystem in Europe using these platforms.

Role and relevance in the project:

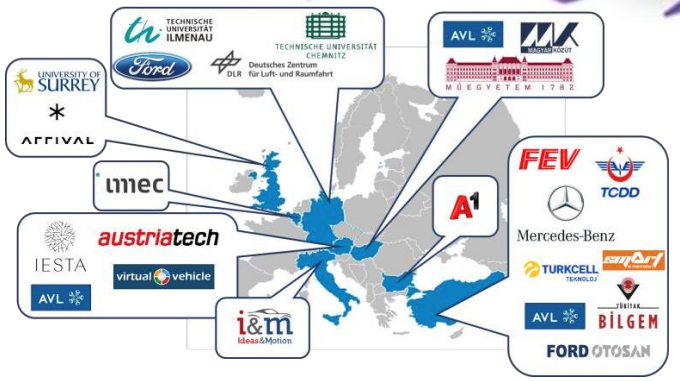
- Develop the FEM based on RFSOI for V2X communication.
- **AI-based Path Planning**

Project partners:

FORD OTOSAN
TURKCELL TEKNOLOJİ
Fraunhofer IPMS
Fraunhofer IZM
Fraunhofer EMFT
Fraunhofer IIS

H2020 - Project Proposals (Submitted)

- **H2020-ICT-53-2020 DECAMERON:** Digitally Enabled Connected and Automated Mobility for European ROads and rail Networks



- **H2020-ICT-53-2020 5G-CENTRIC:** 5G Connected EuropeaN TRasnport InfrastruCture

Role and relevance in these projects:

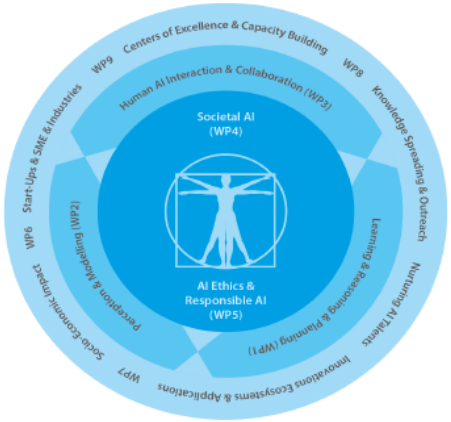
- **Anomaly Detection** over X-Ray Scans with Machine Learning/Deep Learning Abilities
- **Vulnerable Road Users Trajectory Prediction for Protection**

- **H2020-ICT-48-2020 HumanE-AI-Net:** HumanE AI Network

Role and relevance in the project:

Fraunhofer IAIS

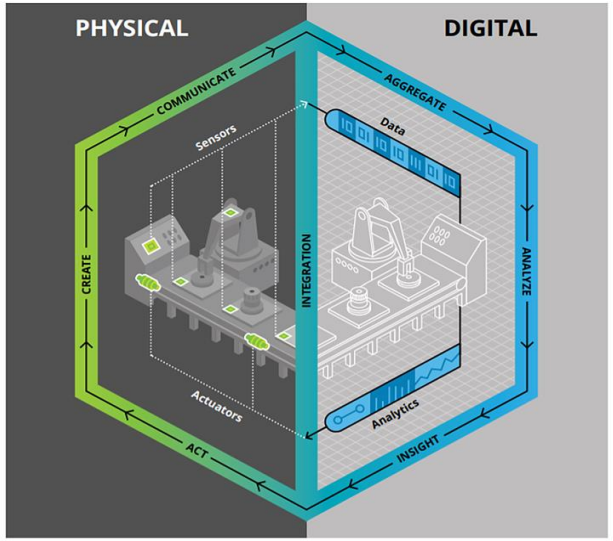
- **Multi Modal Perception and Modeling**
- Applied research with industrial and societal use cases



H2020 - Project Proposals (Submitted)

- **H2020-ICT-38-2020 TandemDEV:** AI-enabled Digital Twin Engineering for Cyber-Physical Production Systems
- **H2020-ICT-38-2020 Romance:** Robust Optimal Manufacturing via Ethical and Trustworthy Artificial Intelligence

Fraunhofer IESE



Role and relevance in these projects:

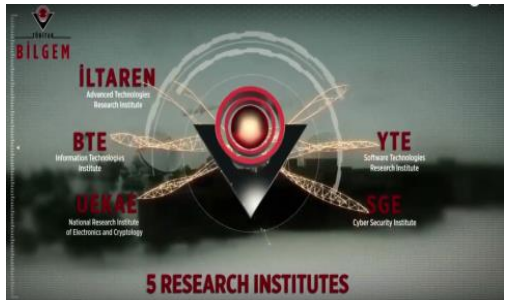
- Creating **digital twins** of robots and equipment
- Creating the Predictive Model for **Predictive Maintenance**
- Deploy the digital twin and the predictive model into action

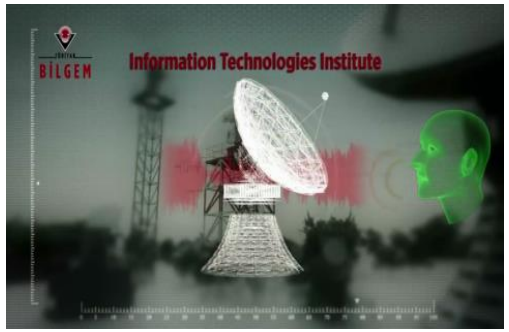
- **H2020-ICT-38-2020 AI Trust:** Trustworthy Artificial Intelligence For Manufacturing

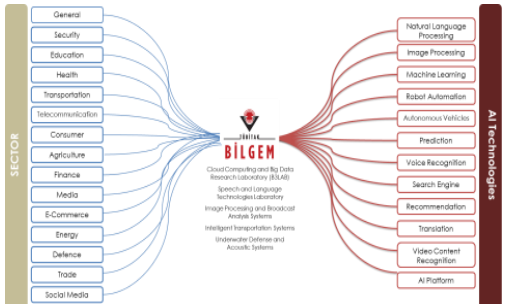
Fraunhofer IESE

Role and relevance in the project:

- Customization & design of COBOTS to be used in production (for repetitive/heavy duty tasks)
- Developing **AI based mind control algorithms** for the **exoskeleton**







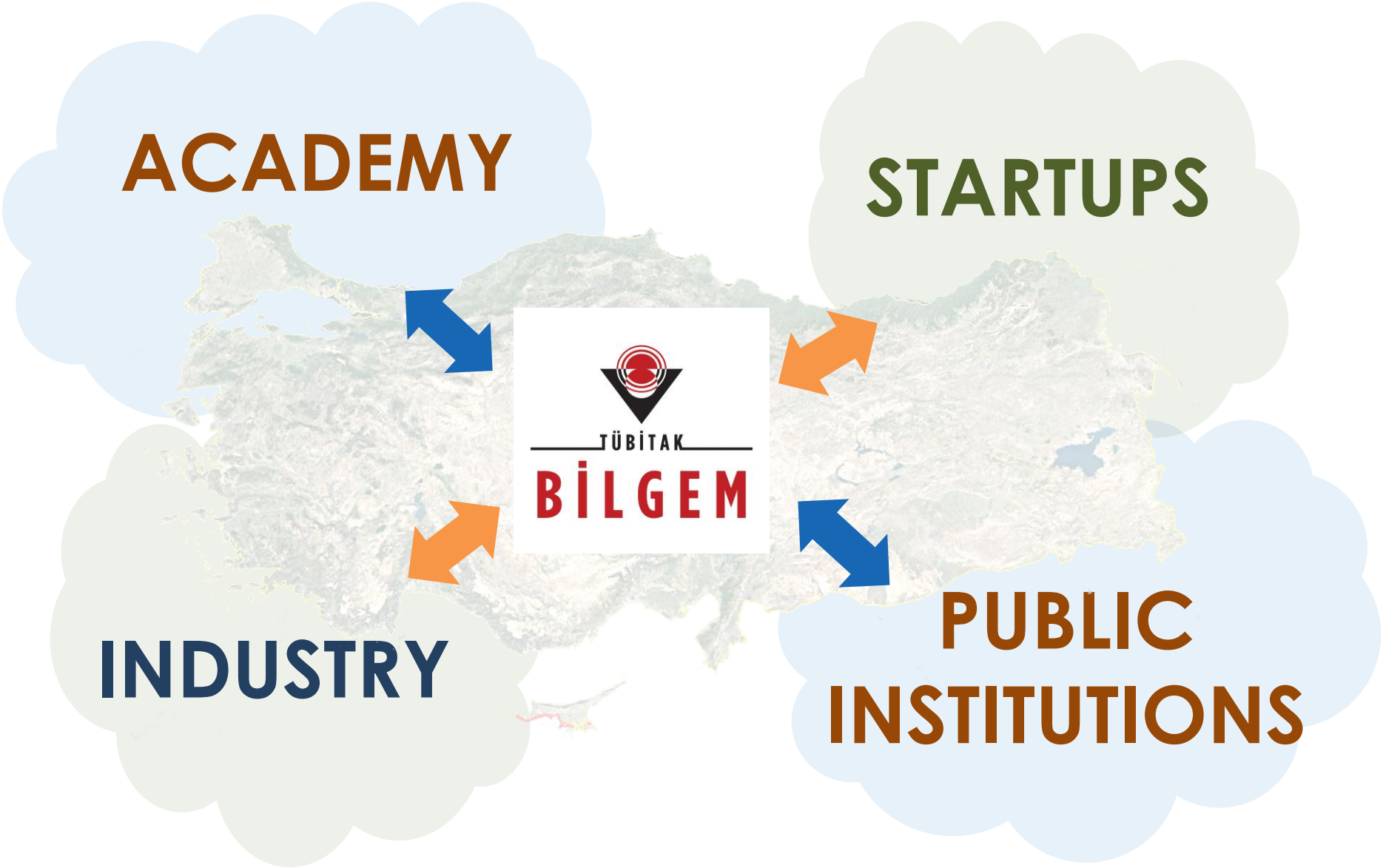
TÜBİTAK BİLGEM Artificial Intelligence Capabilities

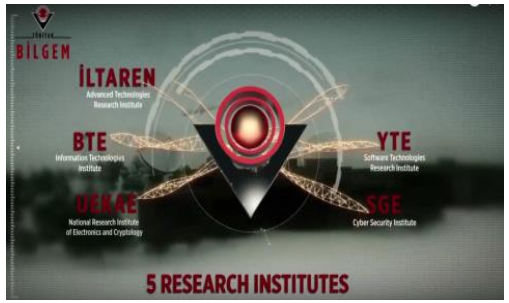
TÜBİTAK BİLGEM Artificial Intelligence Projects

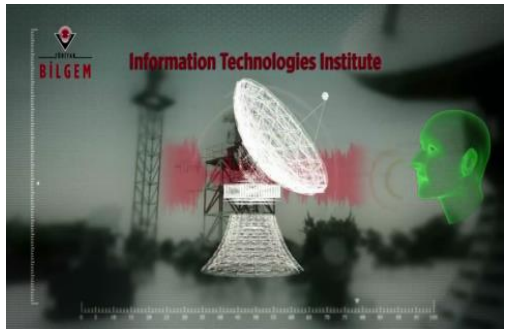
Role of TÜBİTAK BİLGEM in the Ecosystem

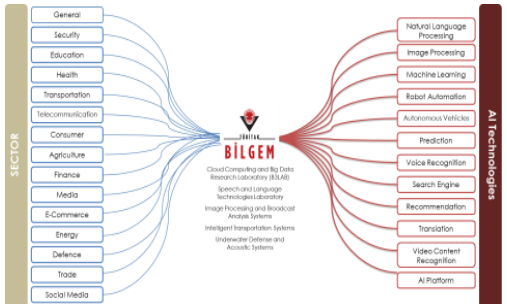
Collaboration Opportunities

Role of TÜBİTAK BİLGEM in the Ecosystem









TÜBİTAK BİLGEM Artificial Intelligence Capabilities

TÜBİTAK BİLGEM Artificial Intelligence Projects

Role of TÜBİTAK BİLGEM in the Ecosystem

Collaboration Opportunities

Collaboration Opportunities:

- ICT-46-2020 Robotics in Application Areas & CS
- ICT-47-2020 Research and Innovation boosting promising robotics applications
- ICT-49-2020 Artificial Intelligence on demand platform

Co-creation Based Collaboration is the key to sustainable development!